STIC EIC 2100 Search Request Form

125
15508

Today's Date: 2/26/04

What date would you like to use to limit the search?
Priority Date: 7/28/2000 Other:

Name Chongshan Chen
AU 2172 Examiner # 79547
Room # 4B25 Phone 305-8319
Serial # 09/788,388

Format for Search Results (Circle One):
(PAPER) DISK EMAIL

Where have you searched so far?
(USP) DWPI EPO JPO ACM IBM TDB
IEEE INSPEC SPI Other _____

Is this a "Fast & Focused" Search Request? (Circle One) YES (NO)
A "Fast & Focused" Search is completed in 2-3 hours (maximum). The search must be on a very specific topic and meet certain criteria. The criteria are posted in EIC2100 and on the EIC2100 NPL Web Page at http://ptoweb/patents/stic/stic-tc2100.htm.

What is the topic, novelty, motivation, utility, or other specific details defining the desired focus of this search? Please include the concepts, synonyms, keywords, acronyms, definitions, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract, background, brief summary, pertinent claims and any citations of relevant art you have found.

A message transmitting and receiving apparatus comprising:

A memory, storing keywords associated with said apparatus and degrees of importance of said keywords;

A detector, detecting an occurrence of a transmitted or received message;

An extractor, in response to the detection of an occurrence of a received message, extracting a keyword from said received message;

Importance determiner unit, determining dynamically a degree of importance of said extracted keyword and updating said keywords and said degrees of importance in said memory such that which keywords are determined to have a high importance changes in accordance with time; and

An indicator, providing an indication of the occurrence of said extracted keyword within said received message in accordance with the determined degree of importance of said extracted keyword.

STIC Searcher David Holloway Phone 308-7704
Date picked up 3-4-04 Date Completed 3-8-04

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Set     Items   Description
S1     539313   (KEY OR INDEX OR DESCRIPTOR)(N)(WORD? OR DICTIONAR? OR THE-
             SAURUS? OR TERM? OR PHRASE? OR VOCABULAR? OR LEXICON?) OR KEY-
             WORD? OR KEYTERM?
S2       4573   S1(3N)(WEIGH? OR SCORE? OR SCORING OR IMPORT? OR SIGNFICAN?
              OR RANK? OR RATE?)
S3     652455   CHAT? OR IRC OR IM OR INSTANT()MESSAG? OR CUCME
S4    7000433   LIVE? OR DYNAMIC? OR HOT OR INSTANT? OR ON(N)FLY?
S5   12463005   UPDAT? OR CHANG? OR REVIS? OR MODIF? OR UP()(DATE? OR DATI-
            NG) OR RESCOR?
S6   21900650   TIME? OR TIMING OR INTERVAL? OR DURATION? OR PERIOD? OR DA-
            ILY OR WEEKLY OR HOURLY OR SCHEDULE?
S7          2   S2(S)S3(S)S4(S)S5
S8          2   S2(S)S3(S)S5(S)S6
S9        151   S2(S)S5(S)S6
S10        15   S9(S)(S3 OR S4)
S11         4   S2(5N)S5(5N)S6
S12        20   S7 OR S8 OR S10 OR S11
S13        14   S1(5N)S3(5N)S5(2N)(S4 OR S6)
S14        34   S12 OR S13
S15        27   RD (unique items)
S16        11   S15 NOT PY>2000
S17         9   S16 NOT PD=20000728:20020728
S18         9   S17 NOT PD=20020728:20040401
S19        49   S2(15N)S5(15N)S6
S20        36   RD (unique items)
S21        30   S20 NOT S15
S22        21   S21 NOT PY>2000
S23        17   S22 NOT PD=20000728:20020728
S24        17   S23 NOT PD=20020728:20040401
File 275:Gale Group Computer DB(TM) 1983-2004/Mar 08
         (c) 2004 The Gale Group
File  47:Gale Group Magazine DB(TM) 1959-2004/Mar 08
         (c) 2004 The Gale group
File  75:TGG Management Contents(R) 86-2004/Feb W5
         (c) 2004 The Gale Group
File 636:Gale Group Newsletter DB(TM) 1987-2004/Mar 08
         (c) 2004 The Gale Group
File  16:Gale Group PROMT(R) 1990-2004/Mar 08
         (c) 2004 The Gale Group
File 624:McGraw-Hill Publications 1985-2004/Mar 08
         (c) 2004 McGraw-Hill Co. Inc
File 484:Periodical Abs Plustext 1986-2004/Feb W5
         (c) 2004 ProQuest
File 613:PR Newswire 1999-2004/Mar 08
         (c) 2004 PR Newswire Association Inc
File 813:PR Newswire 1987-1999/Apr 30
         (c) 1999 PR Newswire Association Inc
File 141:Readers Guide 1983-2004/Jan
         (c) 2004 The HW Wilson Co
File 696:DIALOG Telecom. Newsletters 1995-2004/Mar 08
         (c) 2004 The Dialog Corp.
File 553:Wilson Bus. Abs. FullText 1982-2004/Feb
         (c) 2004 The HW Wilson Co
File 621:Gale Group New Prod.Annou.(R) 1985-2004/Mar 05
         (c) 2004 The Gale Group
File 674:Computer News Fulltext 1989-2004/Feb W4
         (c) 2004 IDG Communications
File  88:Gale Group Business A.R.T.S. 1976-2004/Mar 05
         (c) 2004 The Gale Group
File 369:New Scientist 1994-2004/Feb W5
         (c) 2004 Reed Business Information Ltd.
File 160:Gale Group PROMT(R) 1972-1989
         (c) 1999 The Gale Group
File 635:Business Dateline(R) 1985-2004/Mar 06
         (c) 2004 ProQuest Info&Learning
File  15:ABI/Inform(R) 1971-2004/Mar 08
         (c) 2004 ProQuest Info&Learning
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File 9:Business & Industry(R) Jul/1994-2004/Mar 05
(c) 2004 Resp. DB Svcs.
File 13:BAMP 2004/Feb W5
(c) 2004 Resp. DB Svcs.
File 610:Business Wire 1999-2004/Mar 01
(c) 2004 Business Wire.
File 647:CMP Computer Fulltext 1988-2004/Feb W5
(c) 2004 CMP Media, LLC
File 98:General Sci Abs/Full-Text 1984-2004/Feb
(c) 2004 The HW Wilson Co.
File 148:Gale Group Trade & Industry DB 1976-2004/Mar 05
(c)2004 The Gale Group

18/3,K/8 (Item 1 from file: 635)
DIALOG(R)File 635:Business Dateline(R)

1015490 99-78620
Marketing Web sites is a family business
Troester, David
Business First-Buffalo (Buffalo, NY, US), V15 N9 p34
PUBL DATE: 981207
WORD COUNT: 891
DATELINE: Lewiston, NY, US, Middle Atlantic

TEXT:

...said. A site ranked first one day can drop drastically the next. Ad-Web provides **weekly ranking** reports and **updated key words** to clients.

The company also posts sites in directories and indexes and initiates Intemet merchant...

```
Set     Items   Description
S1       6850   AU=(OKADA S? OR OKADA, S?)
S2       5528   AU=(MURAKAMI M? OR MURAKAMI, M?)
S3       9575   AU=(MATSUMOTO Y? OR MATSUMOTO, Y?)
S4         26   S1 AND S2 AND S3
S5          6   (S1 OR S2 OR S3) AND (KEYWORD? DESCRIPTOR? OR KEY()(WORD? -
              OR TERM? OR PHRASE?))
S6         31   S4 OR S5
S7         31   IDPAT (sorted in duplicate/non-duplicate order)
S8         21   IDPAT (primary/non-duplicate records only)
File 347:JAPIO Oct 1976-2003/Oct(Updated 040202)
         (c) 2004 JPO & JAPIO
File 348:EUROPEAN PATENTS 1978-2004/Feb W04
         (c) 2004 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20040226,UT=20040219
         (c) 2004 WIPO/Univentio
File 350:Derwent WPIX 1963-2004/UD,UM &UP=200415
         (c) 2004  Thomson Derwent
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8/5/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

015379142 **Image available**
WPI Acc No: 2003-440080/200341
XRPX Acc No: N03-351263

Address data management method for online shopping, involves searching address ID included in delivery request from specific table for extracting corresponding address data to deliver purchased article

Patent Assignee: FUJITSU LTD (FUIT)
Inventor: FUJIMOTO S; FUKUI M; KAKUTA J; KIHARA H; **MATSUMOTO Y** ; **MURAKAMI M** ; OHNO T; **OKADA S**
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20030074213	A1	20030417	US 200256089	A	20020128	200341	B
JP 2003123004	A	20030425	JP 2001318217	A	20011016	200341	

Priority Applications (No Type Date): JP 2001318217 A 20011016
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030074213	A1		20	G06F-017/60	
JP 2003123004	A		13	G06F-017/60	

Abstract (Basic): US 20030074213 A1

NOVELTY - A correspondence table indicating correspondence between address data acquired from a purchaser (100) and address IDs established for address data, is managed. A delivery request data generated by a vendor (200) is accepted based on a delivery request from the purchaser. The address ID in the delivery request is searched in the table and corresponding address data is extracted to deliver article to the purchaser.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for an address data management system.

USE - For managing delivery addresses during online shopping.

ADVANTAGE - Allows a purchaser wishing to purchase merchandise from an online shopping site or other vendor to make a purchase and order delivery, while keeping delivery address data secret from third parties, including the seller of the merchandise.

DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of the address data management system.

purchaser (100)

merchandise vendor (200)

pp; 20 DwgNo 1/18

Title Terms: ADDRESS; DATA; MANAGEMENT; METHOD; SHOPPING; SEARCH; ADDRESS; ID; DELIVER; REQUEST; SPECIFIC; TABLE; EXTRACT; CORRESPOND; ADDRESS; DATA ; DELIVER; PURCHASE; ARTICLE
Derwent Class: T01; T05; W01
International Patent Class (Main): G06F-017/60
International Patent Class (Additional): G06F-017/30
File Segment: EPI

8/5/2 (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014459308 **Image available**
WPI Acc No: 2002-280011/200232
XRPX Acc No: N02-218667

Internet chat system stores identifiers and corresponding character trains which are used as message sender identification information, in virtual communication spaces

Patent Assignee: FUJITSU LTD (FUIT); MATSUMOTO Y (MATS-I); MURAKAMI M (MURA-I); OKADA S (OKAD-I)
Inventor: **MATSUMOTO Y** ; **MURAKAMI M** ; **OKADA S**
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No Kind Date Applicat No Kind Date Week
US 20020023128 A1 20020221 US 2001804246 A 20010313 200232 B
JP 2002063124 A 20020228 JP 2000250135 A 20000821 200232

Priority Applications (No Type Date): JP 2000250135 A 20000821
Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
US 20020023128 A1 18 G06F-015/16
JP 2002063124 A 12 G06F-013/00
Abstract (Basic): US 20020023128 A1

NOVELTY - The system configures virtual communication spaces for transmission of messages between terminals in a network. The display device of each terminal displays the message along with character trains which are used as message sender identification information. A table stores the identifiers and corresponding character train in the communication spaces.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for recorded medium storing identifiers for persons using chat system.

USE - Internet chat system.

ADVANTAGE - A character string is displayed instead of a message sender's identifiers, hence one speaker can be indicated by different character strings for different virtual spaces or different character strings can be used and displayed for different receivers. A customer can avoid addressing a question to other customer by mistake. Inadvertent transfer of in-house information into the customer channel can be reduced by using different display names for different channels which also allows the speakers to express their opinions and listener to read the speaker's message.

DESCRIPTION OF DRAWING(S) - The figure shows the display in the display device of the terminal.

pp; 18 DwgNo 2/8

Title Terms: SYSTEM; STORAGE; IDENTIFY; CORRESPOND; CHARACTER; TRAIN; MESSAGE; SEND; IDENTIFY; INFORMATION; VIRTUAL; COMMUNICATE; SPACE
Derwent Class: T01
International Patent Class (Main): G06F-013/00; G06F-015/16
File Segment: EPI

8/5/3 (Item 3 from file: 350)
DIALOG(R)File 350:Derwent WPIX

014391513 **Image available**
WPI Acc No: 2002-212216/200227
XRPX Acc No: N02-162180

Message transmitting and receiving device used in chat system, has processor that determines importance of keyword stored in memory and extracting unit that obtains keyword from received message

Patent Assignee: FUJITSU LTD (FUIT); MATSUMOTO Y (MATS-I); MURAKAMI M (MURA-I); OKADA S (OKAD-I)
Inventor: **MATSUMOTO Y ; MURAKAMI M ; OKADA S**
Number of Countries: 002 Number of Patents: 002
Patent Family:
Patent No Kind Date Applicat No Kind Date Week
JP 2002041431 A 20020208 JP 2000228789 A 20000728 200227 B
US 20020049868 A1 20020425 US 2001788388 A 20010221 200233

Priority Applications (No Type Date): JP 2000228789 A 20000728
Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
JP 2002041431 A 16 G06F-013/00
US 20020049868 A1 G06F-007/00
Abstract (Basic): JP 2002041431 A

NOVELTY - The message transmitting and receiving device (121-125) has a processor that determines the importance of a keyword stored in a memory. An extracting unit obtains the keyword from a received and detected message.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the

following:
(a) the dynamic determination of keyword and its degree of importance from received message;
(b) the message transmission and reception system;
(c) and the recoding medium storing the program for dynamic determination of keyword and its degree of importance.
USE - Used in chat system.
ADVANTAGE - Dynamically determines keyword and its degree of importance in usual internet relay chat (IRC) system.
DESCRIPTION OF DRAWING(S) - The figure schematically shows the interconnection of IRC client PC and IRC server PC in a network and the chat system components. Drawing includes non-English language text.
Message transmitting and receiving device (121-125)
pp; 16 DwgNo 1/7
Title Terms: MESSAGE; TRANSMIT; RECEIVE; DEVICE; SYSTEM; PROCESSOR; DETERMINE; IMPORTANT; KEYWORD; STORAGE; MEMORY; EXTRACT; UNIT; OBTAIN; KEYWORD; RECEIVE; MESSAGE
Derwent Class: T01
International Patent Class (Main): G06F-007/00; G06F-013/00
File Segment: EPI

8/5/4 (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX

013386057
WPI Acc No: 2000-557995/200051
XRPX Acc No: N00-412945
Speech assisting method and device
Patent Assignee: FUJITSU LTD (FUIT)
Inventor: KIHARA H; **MATSUMOTO Y** ; **MURAKAMI M** ; **OKADA S**
Number of Countries: 002 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200041080	A1	20000713	WO 99JP8	A	19990104	200051 B
US 20020010742	A1	20020124	WO 99JP8	A	19990104	200210
			US 2001883996	A	20010620	
JP 2000592738	X	20020508	WO 99JP8	A	19990104	200245
			JP 2000592738	A	19990104	

Priority Applications (No Type Date): WO 99JP8 A 19990104
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200041080	A1	J		G06F-013/00	
Designated States (National): JP US					
US 20020010742	A1			G06F-015/16	Cont of application WO 99JP8
JP 2000592738	X			G06F-013/00	Based on patent WO 200041080

Abstract (Basic): WO 200041080 A1
NOVELTY - A speech assisting device is used with a chat client. In a condition DB (3), predetermined conditionas of speech to one channel and processings of speech correlated to the conditions are stored. An acquiring section (7) acquires information about channel from a chat client according to conditions and processings. A judging section (4) judges whether or not a speech satisfies the conditions based on the acquired channel information before the speech is transmitted to a channel. An execution section (5) executes processings about the speech according to the result of the judgement and conditions and transmits the speech to the channel through the chat client. An example of the conditions is that the speech extends over 30 lines. An example of the processings is that the user is required to confirm the contents of the user's speech.
USE - None given.
pp; 0 DwgNo 0/0
Title Terms: SPEECH; ASSIST; METHOD; DEVICE
Derwent Class: T01; W01
International Patent Class (Main): G06F-013/00; G06F-015/16

International Patent Class (Additional): H04L-012/18; H04L-012/54; H04L-012/58
File Segment: EPI

8/5/5 (Item 5 from file: 350)
DIALOG(R)File 350:Derwent WPIX

012817693 **Image available**
WPI Acc No: 1999-623924/199954
Related WPI Acc No: 1999-575840
XRPX Acc No: N99-460669

Communication management system in chat system - has connection transmitter to transmit acquired utterance to communication unit

Patent Assignee: FUJITSU LTD (FUIT)
Inventor: ITO H; MATSUMOTO T; **MATSUMOTO Y** ; **MURAKAMI M** ; **OKADA S** ; SASAKI K; YAMAUCHI H
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 11272577	A	19991008	JP 9872884	A	19980320	199954	B
US 6393461	B1	20020521	US 99249050	A	19990212	200239	

Priority Applications (No Type Date): JP 9872884 A 19980320; JP 9848101 A 19980227
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 11272577	A		17	G06F-013/00	
US 6393461	B1			G06F-015/16	

Abstract (Basic): JP 11272577 A

NOVELTY - An utterance acquisition unit (111) acquires the utterance which adapts the predetermined condition from information obtained from monitoring unit. Connection transmitter transmits the utterance which perform the acquisition to communication unit (102).

USE - For computer network connected with chat system.

ADVANTAGE - Offers communication management system in a chat system which makes communication establishment realizable. DESCRIPTION OF DRAWING(S) - The figure shows the functional block diagram of communication management system in chat system. (102) Communication unit; (111) Utterance acquisition unit.

Dwg.1/16

Title Terms: COMMUNICATE; MANAGEMENT; SYSTEM; SYSTEM; CONNECT; TRANSMIT; TRANSMIT; ACQUIRE; COMMUNICATE; UNIT
Derwent Class: T01
International Patent Class (Main): G06F-013/00; G06F-015/16
File Segment: EPI

8/5/6 (Item 6 from file: 350)
DIALOG(R)File 350:Derwent WPIX

012769617 **Image available**
WPI Acc No: 1999-575840/199949
Related WPI Acc No: 1999-623924
XRPX Acc No: N99-424999

Utterance log management system for computer network used in chat system - has controller which transmits utterance log stored in each preserving circuit to facsimile machine via computer network, when demand from authenticated user is received

Patent Assignee: FUJITSU LTD (FUIT)
Inventor: ITO H; MATSUMOTO T; **MATSUMOTO Y** ; **MURAKAMI M** ; **OKADA S** ; SASAKI K; YAMAUCHI H
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week

JP 11249990 A 19990917 JP 9848101 A 19980227 199949 B
US 6393461 B1 20020521 US 99249050 A 19990212 200239

Priority Applications (No Type Date): JP 9848101 A 19980227; JP 9872884 A 19980320
Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
JP 11249990 A 12 G06F-013/00
US 6393461 B1 G06F-015/16

Abstract (Basic): JP 11249990 A
NOVELTY - A user authentication log processor (170) verifies the authenticity of the user based on authentication information from a transmitting unit. A controller transmits the utterance log stored in each preserving circuit (151a-151c) to a facsimile machine (330) via computer network, when a demand from an authenticated user is received. DETAILED DESCRIPTION - The utterance log is acquired from a predetermined chat server irrespective of whether the client terminals (110A-130A) are connected to the chat system.
USE - For computer network used in chat system.
ADVANTAGE - Prevents illegal user from participating in the chat system since user authentication is performed. DESCRIPTION OF DRAWING(S) - The figure shows the theoretical block diagram of the utterance log management system. (110A-130A) Client terminals; (151a-151c) Preserving circuit; (170) User authentication log processor; (330) Facsimile machine.
Dwg.3/12
Title Terms: LOG; MANAGEMENT; SYSTEM; COMPUTER; NETWORK; SYSTEM; CONTROL; TRANSMIT; LOG; STORAGE; PRESERVE; CIRCUIT; FACSIMILE; MACHINE; COMPUTER; NETWORK; DEMAND; AUTHENTICITY; USER; RECEIVE
Derwent Class: T01
International Patent Class (Main): G06F-013/00; G06F-015/16
File Segment: EPI

8/5/7 (Item 7 from file: 350)
DIALOG(R)File 350:Derwent WPIX

012648642 **Image available**
WPI Acc No: 1999-454747/199938
XRPX Acc No: N99-340779
Background image display control system for e.g. chat system in computer network - has display control unit that manages background image display corresponding to conditions stored in table storing unit when predetermined condition corresponds to stored conditions
Patent Assignee: FUJITSU LTD (FUIT)
Inventor: **MATSUMOTO Y ; MURAKAMI M ; OKADA S**
Number of Countries: 002 Number of Patents: 002
Patent Family:
Patent No Kind Date Applicat No Kind Date Week
JP 11191765 A 19990713 JP 97358011 A 19971225 199938 B
US 6417819 B1 20020709 US 98216983 A 19981221 200253

Priority Applications (No Type Date): JP 97358011 A 19971225
Patent Details:
Patent No Kind Lan Pg Main IPC Filing Notes
JP 11191765 A 13 H04L-012/18
US 6417819 B1 G09G-005/00
Abstract (Basic): JP 11191765 A
NOVELTY - A display control unit manages the background image display corresponding to the conditions stored in a table storing unit when a predetermined condition corresponds to the stored conditions. DETAILED DESCRIPTION - The system has a server (101) that controls the character data broadcast between computers (110,120,130,210,310) connected to a local area network (100,200,300). A table storing unit stores the defined conditions which are expressed within a chat system. An INDEPENDENT CLAIM is also included for a recording medium that

records the background image display control program.
USE - For e.g. chat system in computer network.
ADVANTAGE - Ensures suitable background image display of character row when chatting with other computers. DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of a computer network. (100,200,300) Local area network; (101) Server; (110,120,130,210,310) Computers.
Dwg.1/12
Title Terms: BACKGROUND; IMAGE; DISPLAY; CONTROL; SYSTEM; SYSTEM; COMPUTER; NETWORK; DISPLAY; CONTROL; UNIT; MANAGE; BACKGROUND; IMAGE; DISPLAY; CORRESPOND; CONDITION; STORAGE; TABLE; STORAGE; UNIT; PREDETERMINED; CONDITION; CORRESPOND; STORAGE; CONDITION
Derwent Class: P85; T01; W01
International Patent Class (Main): G09G-005/00; H04L-012/18
International Patent Class (Additional): G06F-013/00
File Segment: EPI; EngPI

8/5/8 (Item 8 from file: 350)
DIALOG(R)File 350:Derwent WPIX

012642660 **Image available**
WPI Acc No: 1999-448765/199938
XRPX Acc No: N99-335251
Chat system of client and server computers - has client computers which display name, attribute information and frequency of utterance of registered channel, when connection to chat server is performed
Patent Assignee: FUJITSU LTD (FUIT)
Inventor: ITO H; MATSUMOTO T; **MATSUMOTO Y** ; **MURAKAMI M** ; **OKADA S** ; SASAKI K; YAMAUCHI H
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 11184786	A	19990709	JP 97351457	A	19971219	199938	B
US 6345290	B2	20020205	US 98159606	A	19980924	200211	

Priority Applications (No Type Date): JP 97351457 A 19971219
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 11184786	A		13	G06F-013/00	
US 6345290	B2			G06F-015/16	

Abstract (Basic): JP 11184786 A
NOVELTY - Each client computer (3-5) displays the name, attribute information and frequency of utterance of the registered channel, when a connection to a chat server (1) is performed. The chat server switches the communication channel for chatting, based on designated attribute information and frequency of utterance received from each client.
USE - None given.
ADVANTAGE - Simplifies distinction of attribute information and frequency of utterance information in each channel since channel is switched based on received designation information. prevents participation of illegal user since verification and approval of registration are performed. DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of the chat system of client and chat server. (1) Chat server; (3-5) Client computers.
Dwg.1/11
Title Terms: SYSTEM; CLIENT; SERVE; COMPUTER; CLIENT; COMPUTER; DISPLAY; NAME; ATTRIBUTE; INFORMATION; FREQUENCY; REGISTER; CHANNEL; CONNECT; SERVE; PERFORMANCE
Derwent Class: T01
International Patent Class (Main): G06F-013/00; G06F-015/16
File Segment: EPI

8/5/9 (Item 9 from file: 350)
DIALOG(R)File 350:Derwent WPIX

012642563 **Image available**
WPI Acc No: 1999-448668/199938
XRPX Acc No: N99-335154
Service management procedure for chat system - involves specifying script file and managing implementation of script file so that implementation of service is managed
Patent Assignee: FUJITSU LTD (FUIT)
Inventor: ITO H; MATSUMOTO T; **MATSUMOTO Y** ; **MURAKAMI M** ; **OKADA S** ; SASAKI K; YAMAUCHI H
Number of Countries: 002 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 11184681	A	19990709	JP 97351458	A	19971219	199938	B
US 6343333	B1	20020129	US 98159595	A	19980924	200210	

Priority Applications (No Type Date): JP 97351458 A 19971219
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 11184681	A		11	G06F-009/06	
US 6343333	B1			G06F-009/00	

Abstract (Basic): JP 11184681 A

NOVELTY - A script file is specified and the implementation of the script file is managed so that the implementation of a service is managed. A designated service is searched from a service table and a script file after the designation of the service which is going to be implemented is received. DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:a client; a service management apparatus; a recording medium; and a chat system.

USE - For chat system.

ADVANTAGE - Enables reducing the burden of a user who performs service transmission, amendment or deletion in an apparatus, computer or client. DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of the chat system.

Dwg.1/13

Title Terms: SERVICE; MANAGEMENT; PROCEDURE; SYSTEM; SPECIFIED; SCRIPT; FILE; MANAGE; IMPLEMENT; SCRIPT; FILE; SO; IMPLEMENT; SERVICE
Derwent Class: T01
International Patent Class (Main): G06F-009/00; G06F-009/06
File Segment: EPI

8/5/10 (Item 10 from file: 350)
DIALOG(R)File 350:Derwent WPIX

010523257 **Image available**
WPI Acc No: 1996-020210/199602
Related WPI Acc No: 1991-022355; 1992-292693; 1993-019735; 1993-296667; 1996-091011; 1998-155732; 1998-286280; 1998-322056
XRPX Acc No: N96-016890
Text search system for finding user designated search terms - has character string matching device using codes output from character string storage and search terms to decide term presence in text
Patent Assignee: HITACHI LTD (HITA)
Inventor: KATO K; KAWAGUCHI H; SHINOZAKI M; TADA K; AKIZAWA M; FUJINAWA M; FUJISAWA H; HATAKEYAMA A; KANEOKA N; MASUZAKI H; **MURAKAMI M** ; OOYAMA M
Number of Countries: 002 Number of Patents: 004
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 5471610	A	19951128	US 90555483	A	19900809	199602	B
			US 92985795	A	19921130		
			US 9331625	A	19930315		
US 5519857	A	19960521	WO 90JP774	A	19900614	199626	
			US 90555483	A	19900809		
			US 92985795	A	19921130		
JP 2986865	B2	19991206	JP 90193015	A	19900723	200003	
JP 3360308	B2	20021224	JP 9263067	A	19920319	200304	

Priority Applications (No Type Date): JP 92306748 A 19921117; JP 89149630 A 19890614; JP 89188772 A 19890724; JP 89188773 A 19890724; JP 89231567 A 19890908; JP 9263067 A 19920319; JP 92249191 A 19920918
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 5471610	A		63	G06F-017/21	Div ex application US 90555483 CIP of application US 92985795 Div ex patent US 5168533
US 5519857	A		113	G06F-017/30	Cont of application WO 90JP774 Cont of application US 90555483 Cont of patent US 5168533
JP 2986865	B2		98	G06F-017/30	Previous Publ. patent JP 3174652
JP 3360308	B2		22	G06F-017/30	Previous Publ. patent JP 5266082

Abstract (Basic): US 5471610 A

The system includes character string storage (105) storing a piece of text. A filtering device (3000) fetches character codes from the text read out from the string storage device to output only those character codes that are included in the search terms. A character string matching device (102) matches, en bloc, a string of character codes outputted from the filtering device. The search terms decide whether or not the search terms exist in the string of character codes outputted from the filtering device.

A synchronizing device between the filtering device and the character string matching device buffers differences in processing speed while transferring data from the filtering device to the character string matching device.

ADVANTAGE - Gives high speed matching throughput without use of high speed memory. Provides fast and inexpensive text search.

Dwg.1/38

Title Terms: TEXT; SEARCH; SYSTEM; FINDER; USER; DESIGNATED; SEARCH; TERM; CHARACTER; STRING; MATCH; DEVICE; CODE; OUTPUT; CHARACTER; STRING; STORAGE; SEARCH; TERM; DECIDE; TERM; PRESENCE; TEXT
Derwent Class: T01
International Patent Class (Main): G06F-017/21; G06F-017/30
File Segment: EPI

8/5/11 (Item 11 from file: 350)
DIALOG(R)File 350:Derwent WPIX

008518271 **Image available**
WPI Acc No: 1991-022355/199103
Related WPI Acc No: 1992-292693; 1993-019735; 1993-296667; 1996-020210; 1996-091011; 1998-155732; 1998-286280; 1998-322056
XRPX Acc No: N91-017147

Hierarchical presearch-type document retrieval apparatus - has two full text search using two step presearch of character table describing document and table then searched before text data compressed

Patent Assignee: HITACHI LTD (HITA)
Inventor: AKIZAWA M; FUJINAWA M; FUJISAWA H; HATAKEYAMA A; KANEOKA N; KATO K; KAWAGUCHI H; MASUZAKI H; **MURAKAMI M** ; OYAMA M; OOYAMA M; ASAKAWA S
Number of Countries: 013 Number of Patents: 009
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 9016036	A	19901227	WO 90JP774	A	19900614	199103	B
EP 437615	A	19910724	EP 90909360	A	19900614	199130	
US 5168533	A	19921201	US 90555483	A	19900809	199251	
US 5220625	A	19930615	US 90555483	A	19900809	199325	
			US 92914334	A	19920717		
US 5454105	A	19950926	US 90555483	A	19900809	199544	
			US 92985795	A	19921130		
			US 9331700	A	19930315		
US 5519857	A	19960521	WO 90JP774	A	19900614	199626	
			US 90555483	A	19900809		
			US 92985795	A	19921130		

EP 437615	B1	19981021	EP 90909360	A	19900614	199846
			WO 90JP774	A	19900614	
DE 69032712	E	19981126	DE 632712	A	19900614	199902
			EP 90909360	A	19900614	
			WO 90JP774	A	19900614	
US 6094647	A	20000725	WO 90JP774	A	19900614	200038
			US 90555483	A	19900809	
			US 92985795	A	19921130	
			US 95535872	A	19950929	
			US 97839407	A	19970411	

Priority Applications (No Type Date): JP 89231567 A 19890908; JP 89149630 A 19890614; JP 89188772 A 19890724; JP 89188773 A 19890724; JP 91203469 A 19910719; JP 9263064 A 19920319
Cited Patents: JP 1125624; JP 62011932; JP 64074619
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 9016036	A		152		
Designated States (National): US					
Designated States (Regional): AT BE CH DE DK ES FR GB IT LU NL SE					
EP 437615	A				
Designated States (Regional): DE FR GB					
US 5168533	A		120	G10L-003/02	
US 5220625	A		42	G10L-003/02	CIP of application US 90555483 CIP of patent US 5168533
US 5454105	A		43	G06F-017/30	Cont of application US 90555483 CIP of application US 92985795 Cont of patent US 5168533
US 5519857	A		113	G06F-017/30	Cont of application WO 90JP774 Cont of application US 90555483 Cont of patent US 5168533
EP 437615	B1	E		G06F-017/30	Based on patent WO 9016036
Designated States (Regional): DE FR GB					
DE 69032712	E			G06F-017/30	Based on patent EP 437615 Based on patent WO 9016036
US 6094647	A			G06F-017/30	Cont of application WO 90JP774 Cont of application US 90555483 Div ex application US 92985795 Cont of application US 95535872 Div ex patent US 5519857

Abstract (Basic): WO 9016036 A

The document information retrieval method of effecting full text search has an apparatus with a magnetic disc device. Two-step presearch of documents is effected with respect to a **key - word** for the retrieval. In the first step of the presearch, a character table describing, by documents, the presence or absence of all the character codes included in a group of text data of the documents stored is generated in advance. The character table is searched using all character codes that constitute the keyword, and only the documents including the character codes are picked up.

In the second step, compressed text data excluding annexed words contained in the text data and repetetively appearing words are generated, and documents containing the keyword as a word are picked up out of the documents picked up in the first step. After the second step (step 403), a text search (step 404) is effected according to proximity condition, context condition, etc.

Dwg.1/75

Title Terms: HIERARCHY; TYPE; DOCUMENT; RETRIEVAL; APPARATUS; TWO; FULL; TEXT; SEARCH; TWO; STEP; CHARACTER; TABLE; DESCRIBE; DOCUMENT; TABLE; SEARCH; TEXT; DATA; COMPRESS
Derwent Class: P86; T01
International Patent Class (Main): G06F-017/30; G10L-003/02
International Patent Class (Additional): G06F-015/40; G06F-017/40; G11B-027/00
File Segment: EPI; EngPI

8/5/12 (Item 12 from file: 347)
DIALOG(R)File 347:JAPIO

07702363 **Image available**
STATE DISPLAY PROGRAM AND STATE DISTRIBUTION METHOD

PUB. NO.: 2003-196243 [JP 2003196243 A]
PUBLISHED: July 11, 2003 (20030711)
INVENTOR(s): FUJIMOTO SHINGO
ONO TAKASHI
OKADA SUMIYO
MURAKAMI MASAHIKO
TSUNODA JUN
MATSUMOTO YASUHIDE
FUKUI MASAYUKI
KIHARA HIDETO
APPLICANT(s): FUJITSU LTD
APPL. NO.: 2001-400575 [JP 2001400575]
FILED: December 28, 2001 (20011228)
INTL CLASS: G06F-015/00; G06F-003/00; G06F-013/00; G06F-017/60

ABSTRACT

PROBLEM TO BE SOLVED: To realize the display of state information corresponding to the situation of a user while suppressing the operation load of the user.

SOLUTION: An 'action rule' for changing how to display the state information of a body and an 'application situation' indicating a situation where the action rule is applied are stored. For example, in accordance with the rule information of action ID '2', a body list 'be at work' is displayed in hours from 9 to 17 o'clock. Thus, the body list corresponding to the situation of the user is automatically displayed. In accordance with the rule information of the action ID '2', a filter 'working' is used in hours from 8 to 17 o'clock. This filter regulates the non-display of the update notice of the state information to be noticed from any communication address other than '*@ fujitsu.com'. Thus, it is possible to prevent the display of the update notice of the state information from any person other than colleagues in the business hours.

8/5/13 (Item 13 from file: 347)
DIALOG(R)File 347:JAPIO

07640340 **Image available**
COMMUNICATION TERMINAL EQUIPMENT AND COMMUNICATION INFORMATION PRESENTING METHOD

PUB. NO.: 2003-134194 [JP 2003134194 A]
PUBLISHED: May 09, 2003 (20030509)
INVENTOR(s): **OKADA SUMIYO**
MURAKAMI MASAHIKO
ONO TAKASHI
TSUNODA JUN
MATSUMOTO YASUHIDE
FUJIMOTO SHINGO
KIHARA HIDETO
FUKUI MASAYUKI
APPLICANT(s): FUJITSU LTD
APPL. NO.: 2001-323864 [JP 2001323864]
FILED: October 22, 2001 (20011022)
INTL CLASS: H04M-001/00; H04B-007/26; H04M-001/56; H04M-011/00

ABSTRACT

PROBLEM TO BE SOLVED: To smoothly perform communication by recognizing the time at which a communicating party easily performs reception and a communication kind, etc., prior to communication execution at the time of transmission to the communicating party in communication terminal equipment.

SOLUTION: On the basis of communication history information including items such as communication date and time, the communication kind and presence/absence of a response from an opposite party, indicating a history of communication performed in the past with the communicating party stored in the communication terminal equipment such as a portable telephone, from the number of times of the communication in each prescribed time band and the number of times of succeeding in the communication, a response rate in each prescribed time band is analyzed. A time band in which the response rate is high and the response rate of the time band including the present time or the communication kind of the high response rate, etc., are presented to a user as recommended communication information.

8/5/14 (Item 14 from file: 347)

07585109 **Image available**
PORTABLE TERMINAL AND FUNCTION SUPPRESSION METHOD

PUB. NO.: 2003-078952 [JP 2003078952 A]
PUBLISHED: March 14, 2003 (20030314)
INVENTOR(s): **MATSUMOTO YASUHIDE**
MURAKAMI MASAHIKO
OKADA SUMIYO
NODA MASAHIDE
KIHARA HIDETO
ONO TAKASHI
TSUNODA JUN
APPLICANT(s): FUJITSU LTD
APPL. NO.: 2001-261284 [JP 2001261284]
FILED: August 30, 2001 (20010830)
INTL CLASS: H04Q-007/38; G06F-017/60; H04L-009/32; H04M-001/00; H04M-001/66; H04M-001/725; H04Q-007/34

ABSTRACT

PROBLEM TO BE SOLVED: To provide a portable terminal that attains the compatibility between the user-friendliness and the security.

SOLUTION: A user stores its past behavior pattern into a user behavior management table 14. When the user selects a function of the portable terminal at a place and instructs its execution, the user discriminates whether or not the function has been used before around the place on the basis of the table 14. If the function has been used, the selected function is executed. If not, the portable terminal requests the user to enter a password. When the user enters the genuine password, the selected function is executed and a new behavior pattern is added to the table 14. Thus, when the user is going to execute the same function at the same place, the user needs not enter the password.

8/5/15 (Item 15 from file: 347)

07550594 **Image available**
METHOD AND DEVICE FOR AUTHENTICATION INFORMATION GENERATION

PUB. NO.: 2003-044434 [JP 2003044434 A]
PUBLISHED: February 14, 2003 (20030214)
INVENTOR(s): TSUNODA JUN
ONO TAKASHI
MURAKAMI MASAHIKO
OKADA SUMIYO
MATSUMOTO YASUHIDE
NODA MASAHIDE
KIHARA HIDETO
APPLICANT(s): FUJITSU LTD
APPL. NO.: 2001-231311 [JP 2001231311]
FILED: July 31, 2001 (20010731)
INTL CLASS: G06F-015/00; H04L-009/32

ABSTRACT

PROBLEM TO BE SOLVED: To provide easy-to-input authentication information which is used to receive services from a service provider, etc., and corresponds to equipment.

SOLUTION: Profile information on the equipment which receives the services is sent to the service provider side and according to the profile information (terminal type, key array, etc.), authentication information is generated which consists of characters and symbols easily inputted through the equipment to facilitate the operation for inputting authentication information.

8/5/16 (Item 16 from file: 347)
DIALOG(R)File 347:JAPIO

07497978 **Image available**
CHAT TERMINAL EQUIPMENT, CHAT SERVER, CHAT SYSTEM AND CHAT METHOD

PUB. NO.: 2002-366498 [JP 2002366498 A]
PUBLISHED: December 20, 2002 (20021220)
INVENTOR(s): **MURAKAMI MASAHIKO**
OKADA SUMIYO
MATSUMOTO YASUHIDE
NODA MASAHIDE
KIHARA HIDETO
APPLICANT(s): FUJITSU LTD
APPL. NO.: 2001-176130 [JP 2001176130]
FILED: June 11, 2001 (20010611)
INTL CLASS: G06F-013/00; G06F-003/00

ABSTRACT

PROBLEM TO BE SOLVED: To make speeches to be noticed easily identifiable in a chat system for making conversations with character information by using a plurality of chat terminal equipment.
SOLUTION: Information such as the number of times of conversations or conversations including keywords is extracted, and speakers to be noticed are ranked based on the chat history information, and display colors or fonts at the time of display or voices are set corresponding to this rank so that speeches to be noticed can be applied with more easily identifiable configurations.

8/5/17 (Item 17 from file: 347)
DIALOG(R)File 347:JAPIO

07361422 **Image available**
DEVICE FOR CONVERSATION AND METHOD TO PROMOTE CONVERSATION

PUB. NO.: 2002-229919 [JP 2002229919 A]
PUBLISHED: August 16, 2002 (20020816)
INVENTOR(s): KIHARA HIDETO
MURAKAMI MASAHIKO
OKADA SUMIYO
MATSUMOTO YASUHIDE
NODA MASAHIDE
APPLICANT(s): FUJITSU LTD
APPL. NO.: 2001-030635 [JP 200130635]
FILED: February 07, 2001 (20010207)
INTL CLASS: G06F-013/00

ABSTRACT
PROBLEM TO BE SOLVED: To display the state of conversation in a channel.

SOLUTION: The device visually displays the state of conversation in a virtual space by using a graph and a chart. For example, the device generates a log to record a message in the conversation and a time of the message being spoken and also calculates a predetermined analytical item on the basis of the logs. The analytical items are a number of times for speak out, speak out frequencies out, the number of participants, and **key words** . The device is supposed to display the state of conversation in the virtual space 1) in a way to show values of the analytical items on the graph where different items are positioned on a vertical axis and a horizontal axis, 2) in the way to show the value of the analytical items on the graph where the analytical items are on the vertical axis and the times are on the horizontal axis, and 3) in the way to show the states of participated channels with a polygon by changing a size, a figure, and a color of the polygon in response to the state of the conversation.

8/5/18 (Item 18 from file: 347)

06598201 **Image available**
CHARACTER COMMUNICATION METHOD AND CHARACTER COMMUNICATION SYSTEM

PUB. NO.: 2000-183998 [JP 2000183998 A]
PUBLISHED: June 30, 2000 (20000630)
INVENTOR(s): **MATSUMOTO YASUHIDE**
MURAKAMI MASAHIKO
OKADA SUMIYO
APPLICANT(s): FUJITSU LTD
APPL. NO.: 10-361488 [JP 98361488]
FILED: December 18, 1998 (19981218)
INTL CLASS: H04L-029/06; H04L-012/54; H04L-012/58

ABSTRACT

PROBLEM TO BE SOLVED: To enhance convenience of a user by providing a substitute device with a dictionary in which conversion rules of a character message are described by relating it with communication device, notifying an instruction whether the character message to be transmitted and received via the substitute device is converted or not from the communication device to a substitute terminal and converting the character message according to the instruction.

SOLUTION: An agent terminal is provided with a communication part on the server side, a communication part on the client side, a converting part 1, a dictionary managing part 2 and a dictionary data base 3. A conversion mode and a dictionary mode are set by the converting part 1. The character

message to be transmitted from the converting part 1 is converted, based on the dictionary of the dictionary DB 3 by the dictionary managing part 2. In addition, the dictionary of the dictionary DB 3 is updated, based on the instruction from the converting part 1 by the dictionary managing part 2. The dictionaries to be used for conversion and to be updated are the ones which are made correspond to a user terminal. Plural dictionaries are normally stored in the dictionary DB 3 and each dictionary is stored by making it correspond to the user terminal.

8/5/19 (Item 19 from file: 347)

06481406 **Image available**

MESSAGE DISPLAYING METHOD, INFORMATION EXCHANGE SYSTEM AND STORAGE MEDIUM

PUB. NO.: 2000-066983 [JP 2000066983 A]
PUBLISHED: March 03, 2000 (20000303)
INVENTOR(s): **OKADA SUMIYO**
MURAKAMI MASAHIKO
MATSUMOTO YASUHIDE
KIHARA HIDETO
APPLICANT(s): FUJITSU LTD
APPL. NO.: 10-237340 [JP 98237340]
FILED: August 24, 1998 (19980824)
INTL CLASS: G06F-013/00; G06F-015/00; G06F-003/00

ABSTRACT

PROBLEM TO BE SOLVED: To minimize a display area on a display device by displaying a message transmitted and received in plural networks time sequentially, independently of a message of each network.

SOLUTION: A user terminal 10 is provided with a chat system 30 for transmitting and receiving a message to/from another user terminal 10 simultaneously and also in real time. When a message receiving part 33 receives talking from the other user terminal 10, it notifies the received talking to a message displaying part 20 through a message notifying part 32. The notification message receiving part 22 of the part 20 shows the message on a display device 11 through a display processing part 23. The part 23 processes the received message so as to display the message independently of the chat system 30. Thus, talking through all connected channels is shown in the same display area time sequentially.

8/5/20 (Item 20 from file: 347)

04724385 **Image available**

FILING DEVICE

PUB. NO.: 06-195385 [JP 6195385 A]
PUBLISHED: July 15, 1994 (19940715)
INVENTOR(s): **MURAKAMI MASAHARU**
MACHIDA KENJI
FUJINAWA MASAAKI
APPLICANT(s): HITACHI LTD [000510] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 04-342520 [JP 92342520]
FILED: December 22, 1992 (19921222)
INTL CLASS: [5] G06F-015/40
JAPIO CLASS: 45.4 (INFORMATION PROCESSING -- Computer Applications)

JAPIO KEYWORD:R131 (INFORMATION PROCESSING -- Microcomputers & Microprocessers)

ABSTRACT

PURPOSE: To provide filing technique capable of improving operability in retrieval by performing the attachment of retrieval information scrupulously when image data is accumulated without increasing a load or required time on a host device.

CONSTITUTION: This device is the filing device constituted of a code/image conversion part 107 which converts code data arriving from a host 101 via a LAN 118 and a LAW adaptor 104 to the image data. an optical disk 106 in which obtained image data is accumulated, and a **key word** generating adaptor 108 which automatically extracts the **key word** of title information, etc., from the code data, and in which the **key word** extracted from the code data in unit of one piece of image data generated from the code data is stored in the optical disk 106 after it is attached as the retrieval information.

8/5/21 (Item 21 from file: 347)

03060979 **Image available**

PICTURE DATA RETRIEVING DEVICE

PUB. NO.: 02-036479 [JP 2036479 A]
PUBLISHED: February 06, 1990 (19900206)
INVENTOR(s): **OKADA SHINICHI**
APPLICANT(s): NEC CORP [000423] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 63-186502 [JP 88186502]
FILED: July 26, 1988 (19880726)
INTL CLASS: [5] G06F-015/40
JAPIO CLASS: 45.4 (INFORMATION PROCESSING -- Computer Applications)
JOURNAL: Section: P, Section No. 1038, Vol. 14, No. 191, Pg. 93, April 18, 1990 (19900418)

ABSTRACT

PURPOSE: To make index recovery efficient by providing a picture data storing part with a picture associated information control part.

CONSTITUTION: The picture associated information control part B is provided at the head of the picture data storing part 1, and the addresses of picture associated information a(sub 1), a(sub 2)... are recorded in it. At the time of index recovery processing, at first, the picture associated information control part B is read, and the first picture associated information a(sub 1) is read, and an attribute necessitated for generating an index is extracted from the picture associated information a(sub 1), and is turned into a **key word** for retrieval. Next, the address in which the next picture associated information a(sub 2)... is recorded is recognized from the picture associated information control part B, and the picture associated information a(sub 2)... is read. The above-mentioned processing is repeated. Thus, the read of the free area of a picture data part and the discrimination between the free area and a picture associated area can be omitted, and the speed of the index recovery processing can be improved.

```
Set     Items   Description
S1      10554   (KEY OR INDEX OR DESCRIPTOR)(N)(WORD? OR DICTIONAR? OR THE-
             SAURUS? OR TERM? OR PHRASE? OR VOCABULAR? OR LEXICON?) OR KEY-
             WORD? OR KEYTERM?
S2        280   S1(3N)(WEIGH? OR SCORE? OR SCORING OR IMPORT? OR SIGNFICAN?
              OR RANK? OR RATE?)
S3      13809   CHAT? OR IRC OR IM OR INSTANT()MESSAG? OR CUCME
S4     712254   LIVE? OR DYNAMIC? OR HOT OR INSTANT? OR ON(N)FLY?
S5    1660274   UPDAT? OR CHANG? OR REVIS? OR MODIF? OR UP()(DATE? OR DATI-
             NG) OR RESCOR?
S6    3580545   TIME? OR TIMING OR INTERVAL? OR DURATION? OR PERIOD? OR DA-
             ILY OR WEEKLY OR HOURLY OR SCHEDULE?
S7          0   S2 AND S3 AND S4 AND S5 AND S6
S8         10   S2 AND S5 AND S6
S9        379   S1 AND S5 AND S6
S10         2   S9 AND S3
S11        50   S1 AND S4 AND S5
S12         0   S1 AND S3 AND S4 AND S5 AND S6
S13         2   S1 AND S3 AND S5 AND S6
S14        14   S1 AND S4 AND S5 AND S6
S15        67   S2 AND S6
S16        13   S15 AND (S3 OR S4 OR S5)
S17        28   S16 OR S14 OR S13 OR S10 OR S8
S18        24   S17 AND IC=(G06F? OR H04L?)
S19        24   IDPAT (sorted in duplicate/non-duplicate order)
S20        23   IDPAT (primary/non-duplicate records only)
File 347:JAPIO Oct 1976-2003/Oct(Updated 040202)
         (c) 2004 JPO & JAPIO
File 350:Derwent WPIX 1963-2004/UD,UM &UP=200415
         (c) 2004  Thomson Derwent
```

20/5/4 **(Item 4 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

013945069 **Image available**
WPI Acc No: 2001-429282/200146
XRPX Acc No: N01-318725

Communication assistance procedure for internet relay chat **involves computing characteristic of virtual space based on category of** keyword **matched with virtual space and notifying characteristic to user**

Patent Assignee: FUJITSU LTD (FUIT)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 2001147880	A	20010529	JP 99331576	A	19991122	200146	B

Priority Applications (No Type Date): JP 99331576 A 19991122
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 2001147880	A		13	G06F-013/00	

Abstract (Basic): JP 2001147880 A

NOVELTY - A **keyword** and a category are matched. The category of the **keyword** is specified when the **keyword** is included in a message transmitted and received in virtual space. A message is matched with the category and the **keyword** and is stored afterwards. The characteristic of the virtual space is computed based on the category of the **keyword** matched with the virtual space and notified to a user.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a communication support system.

USE - For internet relay **chat** (**IRC**).

ADVANTAGE - Simplifies selection of virtual space in conversation system. Allows notification of characteristic reflecting real **time** content of conversation to user since characteristic of virtual space is computed based on content of conversation itself even when content of conversation **changes** .

DESCRIPTION OF DRAWING(S) - The figure shows the entire block diagram of a communication support system.

pp; 13 DwgNo 1/8

Title Terms: COMMUNICATE; ASSIST; PROCEDURE; RELAY; COMPUTATION; CHARACTERISTIC; VIRTUAL; SPACE; BASED; CATEGORY; **KEYWORD** ; MATCH; VIRTUAL; SPACE; NOTIFICATION; CHARACTERISTIC; USER
Derwent Class: T01
International Patent Class (Main): **G06F-013/00**
File Segment: EPI

20/5/7 **(Item 7 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

012352400 **Image available**
WPI Acc No: 1999-158507/199914
XRPX Acc No: N99-115110

Document processing method for extracting specific keyword from a passed document and for forming knowledge data - involves forming knowledge data based on extracted important keyword **, and storing knowledge data in document data memory**

Patent Assignee: OMRON KK (OMRO)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 11015854	A	19990122	JP 97181818	A	19970624	199914	B

Priority Applications (No Type Date): JP 97181818 A 19970624
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 11015854	A		14	G06F-017/30	

Abstract (Basic): JP 11015854 A

NOVELTY - Knowledge data in a formed object area, in which an extracted document exists, are formed based on an extracted **important keyword** , and are stored in a document data memory (16). The **important keyword** about the document is extracted within the formation **time** of the document existing in the object area. DETAILED DESCRIPTION - A keyword extractor (12) computes and extracts an **important keyword** from a passed document. The data, containing the keyword formation **time** information of the passed document, are stored in a document data and keyword ensemble memory (13) which is accessed based on the object area set by inputting arbitrary **time** on a **time** axis. INDEPENDENT CLAIMS are included for the following:a document processing apparatus; and a recording medium storing the document processing method.

USE - For extracting specific keyword from a passed document and for forming knowledge data serving as evaluation reference in describing the document.

ADVANTAGE - Tracks, alters and accurately determines knowledge data even if the user's interest object varies. Detects how a user's contrary for interest is **changed** . DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of the document processing apparatus. (12) keyword extractor; (13) document data and keyword ensemble memory; (16) document data memory .

Dwg.2/14

Title Terms: DOCUMENT; PROCESS; METHOD; EXTRACT; SPECIFIC; KEYWORD; PASS; DOCUMENT; FORMING; DATA; FORMING; DATA; BASED; EXTRACT; IMPORTANT; KEYWORD; STORAGE; DATA; DOCUMENT; DATA; MEMORY
Derwent Class: T01
International Patent Class (Main): **G06F-017/30**
File Segment: EPI

20/5/9 **(Item 9 from file: 350)**
DIALOG(R)File 350:Derwent WPIX

009307881 **Image available**
WPI Acc No: 1993-001317/199301
XRPX Acc No: N93-000858
Dynamic **lexicon** updating **method for database system - marks lexicon additions and processes subsets of additions to** update **concordance and citation phrase indices**
Patent Assignee: DIGITAL EQUIP CORP (DIGI)
Inventor: ANICK P G; FLYNN R A
Number of Countries: 005 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 520488	A2	19921230	EP 92110807	A	19920626	199301	B
US 5251316	A	19931005	US 91723229	A	19910628	199341	
EP 520488	A3	19931013	EP 92110807	A	19920626	199510	
EP 520488	B1	19981223	EP 92110807	A	19920626	199904	
DE 69227948	E	19990204	DE 627948	A	19920626	199911	
			EP 92110807	A	19920626		

Priority Applications (No Type Date): US 91723229 A 19910628
Cited Patents: No-SR.Pub; 4.Jnl.Ref; JP 2044467; JP 2297189
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 520488	A2	E	24	G06F-015/401	
Designated States (Regional): DE FR GB IT					
US 5251316	A		21	G06F-015/40	
EP 520488	B1	E		G06F-017/30	
Designated States (Regional): DE FR GB IT					
DE 69227948	E			G06F-017/30	Based on patent EP 520488
EP 520488	A3			G06F-015/401	

Abstract (Basic): EP 520488 A
The database system provides access to text based articles via retrieval requests. The system includes a database (20) of articles, a lexicon (22) and its index (24), a citation/ **phrase index** (26) and a concordance index (28). The database is organised as a temporal data base so that versions of the elements for given **times** is maintained.
Lemmas and phrases can be added to the lexicon at any point without reloading the lexicon. Each addition is marked with a **time** stamp. Subsets of the additions are selected and processed as a background task to **update** the other indices.
ADVANTAGE - Provides **dynamically updatable** lexicon without reloading whole system.
Dwg.2/11
Title Terms: **DYNAMIC** ; **UPDATE** ; METHOD; DATABASE; SYSTEM; MARK; ADD; PROCESS; SUBSET; ADD; **UPDATE** ; CONCORDANCE; PHRASE; INDEX
Derwent Class: T01
International Patent Class (Main): **G06F-015/40** ; **G06F-015/401** ; **G06F-017/30**
File Segment: EPI

05841425 **Image available**
RETRIEVING DEVICE

PUB. NO.: 10-124525 [JP 10124525 A]
PUBLISHED: May 15, 1998 (19980515)
INVENTOR(s): NOMURA HIROYOSHI
APPLICANT(s): MATSUSHITA ELECTRIC IND CO LTD [000582] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 08-281051 [JP 96281051]
FILED: October 23, 1996 (19961023)
INTL CLASS: [6] **G06F-017/30**
JAPIO CLASS: 45.4 (INFORMATION PROCESSING -- Computer Applications)

ABSTRACT

PROBLEM TO BE SOLVED: To provide a more flexible and efficient retrieving device with which the concept of similarity in similarity retrieval is shown easy to comprehend, the attributes of retrieval conditions are flexibly **changed** and expanded, the **periodicity** or the like of a retrieval process is detected and auseless retrieval procedures are excluded.

SOLUTION: Stored document data in a data base(DB) part 1 are designated by a document data designating part 4, and an additional **keyword** is detected by a retrieving person designating document **keyword** detecting part 6. A similarity retrieval **keyword** determining part 7 generates this detected **keyword** , the similarity retrieval **keyword** of a retrieval history managing part 8 and **keyword** for similarity retrieval from the history of retrieval, a similar document data retrieval part 10 calculates the degree of matching with document data, a similar document data display position calculating part 12 calculates the display position of document data from this degree of matching, and these data are displayed on a document data display part 3. When the retrieval is repetition having **periodicity** , a fractal dimension is calculated from the history of retrieved document numbers, **periodicity** is discriminated and retrieval attributes and conditions are **dynamically changed** .

20/5/21 (Item 21 from file: 347)
DIALOG(R)File 347:JAPIO

03589867 **Image available**
KEY WORD ASSOCIATIVE GENERATOR

PUB. NO.: 03-252767 [JP 3252767 A]
PUBLISHED: November 12, 1991 (19911112)
INVENTOR(s): IWADERA TOSHINORI
KIMOTO HARUO
KISHIDA YOSHINORI
APPLICANT(s): NIPPON TELEGR & TELEPH CORP <NTT> [000422] (A Japanese Company or Corporation), JP (Japan)
APPL. NO.: 02-049536 [JP 9049536]
FILED: March 02, 1990 (19900302)
INTL CLASS: [5] **G06F-015/40**
JAPIO CLASS: 45.4 (INFORMATION PROCESSING -- Computer Applications)
JOURNAL: Section: P, Section No. 1309, Vol. 16, No. 53, Pg. 84, February 10, 1992 (19920210)

ABSTRACT

PURPOSE: To shorten retrieval working **time** by performing retrieval by automatically generating an associative **key word** that is an appropriate **key word** for retrieval on which information is complemented at the **key word** for retrieval.

CONSTITUTION: A thesaurus link generating part 3 generates a **dynamic** thesaurus in which a link generated by using document information is attached on a thesaurus 2, and a **key word** input part 4 for retrieval accepts the input of the **key word** for retrieval from a user. An associative **key word** generating part 5 generates a node coupled with the link one after another from the node corresponding the the **key word** for retrieval inputted by the user by using the **dynamic** thesaurus as the associative **key word** complementing the optimum information to the **key word** for retrieval. In such a way, it is possible to dispense with work to **change** the **key word** for retrieval and to repeat the retrieval, which shortens the retrieval working **time** .

```
Set     Items   Description
S1       8873   (KEY OR INDEX OR DESCRIPTOR)(N)(WORD? OR DICTIONAR? OR THE-
             SAURUS? OR TERM? OR PHRASE? OR VOCABULAR? OR LEXICON?) OR KEY-
             WORD? OR KEYTERM?
S2        399   S1(3N)(WEIGH? OR SCORE? OR SCORING OR IMPORT? OR SIGNFICAN?
              OR RANK? OR RATE?)
S3     645289   CHAT? OR IRC OR IM OR INSTANT()MESSAG? OR CUCME
S4     471363   LIVE? OR DYNAMIC? OR HOT OR INSTANT? OR ON(N)FLY?
S5    1538766   UPDAT? OR CHANG? OR REVIS? OR MODIF? OR UP()(DATE? OR DATI-
             NG) OR RESCOR?
S6    1152720   TIME? OR TIMING OR INTERVAL? OR DURATION? OR PERIOD? OR DA-
             ILY OR WEEKLY OR HOURLY OR SCHEDULE?
S7          1   S2(S)S3(S)S4(S)S5(S)S6
S8         27   S1(S)S3(S)S4(S)S5(S)S6
S9          2   S2(S)S3(S)S5
S10         4   S1(10N)S3(10N)S5(10N)S6
S11         0   S2(5N)S3
S12         0   S2(10N)S3
S13        73   S2(S)S5
S14         8   S2(S)S3
S15        36   S14 OR S10 OR S9 OR S8 OR S7
S16        29   S15 AND IC=(G06F? OR H04L?)
S17        29   IDPAT (sorted in duplicate/non-duplicate order)
S18        29   IDPAT (primary/non-duplicate records only)
File 348:EUROPEAN PATENTS 1978-2004/Feb W05
         (c) 2004 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20040304,UT=20040226
         (c) 2004 WIPO/Univentio
```

18/5,K/3 (Item 3 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00959292 **Image available**

SYSTEM AND METHOD FOR CLUSTERING AND VISUALIZATION OF ONLINE CHAT

SYSTEME ET PROCEDE POUR LE REGROUPEMENT ET LA VISUALISATION PROPRES A UNE CONVERSATION EN LIGNE

Patent Applicant/Assignee:
KENT RIDGE DIGITAL LABS, 21 Heng Mui Keng Terrace, Singapore 119613, SG, SG (Residence), SG (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
WONG Lung Hsiang, Block 902, Jurong West Street 91, #04-109, Singapore 640902, SG, SG (Residence), MY (Nationality), (Designated only for: US)
LOOI Chee Kit, Block 112, Potong Pasir Avenue 1,, #05-670, Singapore 350112, SG, SG (Residence), SG (Nationality), (Designated only for: US)
Legal Representative:
GREENE-KELLY James Patrick (agent), Lloyd Wise, Tanjong Pagar, P.O. Box 636, Singapore 910816, SG,

Patent and Priority Information (Country, Number, Date):
Patent: WO 200293414 A1 20021121 (WO 0293414)
Application: WO 2001SG89 20010511 (PCT/WO SG0100089)
Priority Application: WO 2001SG89 20010511
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Main International Patent Class: **G06F-017/21**
International Patent Class: **G06F-017/30**
Publication Language: English
Filing Language: English
Fulltext Availability:
Detailed Description
Claims
Fulltext Word Count: 4648

English Abstract
This invention provides a system and method of creating temporal clusters of content included in a chat session and representing such clusters in a chat timeline. The chat timeline provides a visul summary of the content of the chat session. The system further incldues additional user-friendly features that allow a user to view statistics of particular clusters, patterns of the chat session, and other relevant chat information.

French Abstract
L'invention concerne un systeme et un procede pour la creation de groupes temporaires de contenu propres a une conversation en ligne, et pour la visualisation de ces groupes dans un historique du deroulement de la conversation qui donne un apercu visuel du contenu de la conversation. Le systeme offre egalement des fonctions conviviales qui permettent a l'utilisateur de passer en revue les statistiques correspondant a des groupes de contenu particuliers, les orientations de la conversation et d'autres informations pertinentes sur le contenu de la conversation.

Legal Status (Type, Date, Text)
Publication 20021121 A1 With international search report.
Examination 20030206 Request for preliminary examination prior to end of 19th month from priority date

Main International Patent Class: **G06F-017/21**
International Patent Class: **G06F-017/30**
Fulltext Availability:
Detailed Description

Detailed Description
... private chat session
for further discussion on the content of a current chat session;
(2) **updating** chatters on topic **changes** and further including a feature to notify a **chatter** who is participating in a topic-based discussion when the
chatter **changes** the topic;
(3) construction of a cluster search engine that allows a user to search a
chat log by topic or **keyword** ;
(4) detection of regular **time** -based patterns of discussion in a **chat** room.

A **time** -based pattern of a **chat** room may include discussing a specific
topic at a certain **time** on a particular day of the week. Thus, for example,
an embodiment of this feature...different "confidence ratings," depending on which mapping is more likely to happen. For example, a **chat** room with a computer theme may assign the highest rating to the mapping of "Java 4 programmingjanguages"; whereas a **chat** room with a Southeast Asian-theme may give "Java 4 geography" the highest rating. A dictionary editor is provided for the **chat** room administrator to add/delete topics, re-arrange the topic hierarchy, add/delete **keywords** , and edit confidence **rates** .

Once the topic list for an utterance is generated, the system divides the utterance into...

18/5,K/9 (Item 9 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00816775 **Image available**
COLLABORATION TOOL VIA COMPUTER NETWORK
OUTIL DE COLLABORATION POUR RESEAU INFORMATIQUE
Patent Applicant/Assignee:
GENERAL ELECTRIC COMPANY, 1 River Road, Schenectady, NY 12345, US, US (Residence), US (Nationality)
Inventor(s):
DAVID Jennifer L, 121D Forest Grove, Twin Lakes Apartments, Clifton Park, NY 12065, US,
Legal Representative:
SNYDER Bernard (et al) (agent), General Electric Company, 3135 Easton Turnpike W3C, Fairfield, CT 06431, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200150302 A2-A3 20010712 (WO 0150302)
Application: WO 2000US31336 20001115 (PCT/WO US0031336)
Priority Application: US 99173746 19991230; US 2000498034 20000204
Designated States: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ VN YU ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Main International Patent Class: **G06F-017/60**
Publication Language: English
Filing Language: English
Fulltext Availability:
Detailed Description
Claims
Fulltext Word Count: 5121

English Abstract
A method, system, and computer program product for facilitating collaboration over a computer network. A central database is established based on keywords or concepts descriptive of areas of interest to network user, and descriptive of resources known to network users, and the database can be automatically updated after each use or on a periodic basis. The database can be accessed by network users to identify resources known to others, thereby improving efficiency.

French Abstract
L'invention concerne un procede, un systeme et un programme informatique destines a faciliter la collaboration sur un reseau informatique. Une base de donnees centrale est etablie sur la base de mots-cles ou de concepts representant des zones d'interet pour un utilisateur de reseau ainsi que des ressources connues des utilisateurs de reseau, ladite base de donnees pouvant etre automatiquement mise a jour apres chaque utilisation ou sur une base periodique. Les utilisateurs de reseau peuvent acceder a cette base de donnees pour identifier des ressources connues d'autres utilisateurs, d'ou une efficacite amelioree.

Legal Status (Type, Date, Text)
Publication 20010712 A2 Without international search report and to be republished upon receipt of that report.
Examination 20010913 Request for preliminary examination prior to end of 19th month from priority date
Search Rpt 20020314 Late publication of international search report
Republication 20020314 A3 With international search report.

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
Detailed Description

Detailed Description
... inforination.

In step 206, an information update is performed. This step can be performed each **time** an individual users modifies information in his or her personal profile, 5 submits a new electronic document, or otherwise **modifies** infori-nation stored in the network. To ensure that **periodic modification** occurs, this step can be executed by software instructions which automatically perforin scanning to extract **keywords** from any electronic documents not previously scanned (or any message board or **chat** room postings), automatically send electronic mail messages to persons identified in the database (or to all network users) requesting **updated** information, or other suitable update activities. Such an automatic update can be performed **periodically** at a frequency determined by a network administrator, or at a frequency specified by an ...

```
Set     Items   Description
S1       1060   (KEY OR INDEX OR DESCRIPTOR)(N)(WORD? OR DICTIONAR? OR THE-
            SAURUS? OR TERM? OR PHRASE? OR VOCABULAR? OR LEXICON?) OR KEY-
            WORD? OR KEYTERM?
S2         21   S1(3N)(WEIGH? OR SCORE? OR SCORING OR IMPORT? OR SIGNFICAN?
             OR RANK? OR RATE?)
S3       1783   CHAT? OR IRC OR IM OR INSTANT()MESSAG? OR CUCME
S4      10379   LIVE? OR DYNAMIC? OR HOT OR INSTANT? OR ON(N)FLY?
S5      19145   UPDAT? OR CHANG? OR REVIS? OR MODIF? OR UP()(DATE? OR DATI-
            NG) OR RESCOR?
S6      28844   TIME? OR TIMING OR INTERVAL? OR DURATION? OR PERIOD? OR DA-
            ILY OR WEEKLY OR HOURLY OR SCHEDULE?
S7          1   S2 AND S3
S8          0   S2 AND S4 AND S5
S9          5   S2 AND S5
S10         1   S9 AND S6
S11         5   S2 AND S6
S12         9   S9 OR S11
S13         8   S12 NOT PY>2000
S14         7   S13 NOT PD>20000728
File 256:SoftBase:Reviews,Companies&Prods. 82-2004/Jan
         (c)2004 Info.Sources Inc
```

14/3,K/1
DIALOG(R)File 256:SoftBase:Reviews,Companies&Prods.

01784664 DOCUMENT TYPE: Product

PRODUCT NAME: KnowledgeMail (784664)

Tacit Knowledge Systems Inc (672955)
990 Commercial St 2nd Floor
Palo Alto, CA 94303 United States
TELEPHONE: (650) 251-2000

RECORD TYPE: Directory

CONTACT: Sales Department

REVISION DATE: 020625

...Security features support employee privacy, letting users anonymously respond to selected requests. KnowledgeMail searches by **keyword** and example, **ranks** results based on expertise, and **updates** its database continuously. The system also integrates with knowledge management portals. KnowledgeMail's scripted account...

14/3,K/2
DIALOG(R)File 256:SoftBase:Reviews,Companies&Prods.

01620939 DOCUMENT TYPE: Product

PRODUCT NAME: Alaras Tropix (620939)

Alaras Corp (588253)
1910 Sedwick Rd #300-D PO Box 14866
Research Triangle Park, NC 27709-4866 United States
TELEPHONE: (919) 544-1228

RECORD TYPE: Directory

CONTACT: Sales Department

REVISION DATE: 20000802

...manage their files, choosing how to view them. They can also translate between graphics formats, **modify** images to make them better suited for publication on the Web, and even measure the...

...the product include user-defined custom fields, image resizing, group and user security, user-designed **keyword** hierarchies, and extensive **import** and export features. The software is designed to work easily with plug-ins, from Alaras...

14/3,K/3
DIALOG(R)File 256:SoftBase:Reviews,Companies&Prods.

01378283 DOCUMENT TYPE: Product

PRODUCT NAME: Raosoft EZREPORT 4.5 (378283)

Raosoft Inc (526126)
6645 NE Windermere Rd
Seattle, WA 98115-7942 United States
TELEPHONE: (206) 525-4025

RECORD TYPE: Directory

CONTACT: Sales Department

REVISION DATE: 20020125

...experts select from menus to write their own reports. EZREPORT is powerful and can support **periodic** report preparation. It provides additional capacity to users of Raosoft SURVEYWin and EZSurvey for the...

...system can compare questions with gap analysis and analyze comment fields across categories and with **keywords** and with **weight** -stratified samples with Raosoft's unique Population Readjustment Analysis (PRA).

14/3,K/4
DIALOG(R)File 256:SoftBase:Reviews,Companies&Prods.

01139246 DOCUMENT TYPE: Product

PRODUCT NAME: Verity NativeX SDK (139246)

Verity Inc (454427)
894 Ross Dr
Sunnyvale, CA 94089 United States
TELEPHONE: (408) 541-1500

RECORD TYPE: Directory

CONTACT: Sales Department

REVISION DATE: 20030518

...content retrieval features. Employing XML technology, it can access application information. Verity NativeX SDK includes **keyword** , relevance **ranking** , natural language search, file format filtering, and other features. It also provides users with Boolean...

...streamline integration tasks. The system offers users full-text indexing of unstructured content, and it **updates** indexes in real **time** . The program handles XML, HTML, PDF, Microsoft (R) Office (R), and 225 other document formats...

14/3,K/5
DIALOG(R)File 256:SoftBase:Reviews,Companies&Prods.

01026093 DOCUMENT TYPE: Product

PRODUCT NAME: HighestRank.com (026093)

EldAr Co (643742)
95 Liberty St #A8
Stamford, CT 06902 United States
TELEPHONE: (203) 323-4363

RECORD TYPE: Directory

CONTACT: Sales Department

REVISION DATE: 20010330

...will not browse any lower in the results). HighestRank.com provides more than a one- **time** set of suggestions: it includes monitoring services to fine-tune each page's placement. Reports provided by HighestRank.com's monitor list each page and **keyword** phrase-combination's **ranking** . Site

owners can compare today's rankings with those of the last report and can
...

14/3,K/6
DIALOG(R)File 256:SoftBase:Reviews,Companies&Prods.

00119279 DOCUMENT TYPE: Review

PRODUCT NAMES: Metabot Pro 1.0 (751103)

TITLE: Metabot Just Hits the Mark
AUTHOR: Jackson, Steve
SOURCE: InternetWeek, v783 p50(1) Oct 4, 1999
ISSN: 0746-8121
HOMEPAGE: http://www.internetwk.com

RECORD TYPE: Review
REVIEW TYPE: Review
GRADE: A

REVISION DATE: 20010330

...shows all data in a spreadsheet format so that users can easily see existing tags, **update** outdated ones, and add completely new tags. Users, for instance, can easily add a new...

...added to the spreadsheet. Metabot has a user-friendly interface and an equally impressive automated **keyword** generator. The most **important** purpose of metatags is to provide keywords to a search engine; keywords are used to...

14/3,K/7
DIALOG(R)File 256:SoftBase:Reviews,Companies&Prods.

00075359 DOCUMENT TYPE: Review

PRODUCT NAMES: PageKeeper Pro (410268)

TITLE: Imaging is Everything
AUTHOR: Steeves, Ryan
SOURCE: PC Today, v9 n3 p56(1) Mar 1995
ISSN: 1040-6484
HOMEPAGE: http://www.pctoday.com

RECORD TYPE: Review
REVIEW TYPE: Product Analysis
GRADE: Product Analysis, No Rating

REVISION DATE: 20000930

...recent earnings statistics. PageKeeper translates characters correctly for this user about 98 percent of the **time** , using an engine with the ability to learn. After scanning a document, PageKeeper offers an...

...searching. This is accomplished with Natural Language Processing, but users can also select their own **keywords** . Quick availability of **rate** verification makes it easy to maintain credibility and to develop new clients.

```
Set     Items   Description
S1      65541   (KEY OR INDEX OR DESCRIPTOR)(N)(WORD? OR DICTIONAR? OR THE-
             SAURUS? OR TERM? OR PHRASE? OR VOCABULAR? OR LEXICON?) OR KEY-
             WORD? OR KEYTERM?
S2        980   S1(3N)(WEIGH? OR SCORE? OR SCORING OR IMPORT? OR SIGNFICAN?
              OR RANK? OR RATE?)
S3     201465   CHAT? OR IRC OR IM OR INSTANT()MESSAG? OR CUCME
S4    4191240   LIVE? OR DYNAMIC? OR HOT OR INSTANT? OR ON(N)FLY?
S5    6072042   UPDAT? OR CHANG? OR REVIS? OR MODIF? OR UP()(DATE? OR DATI-
             NG) OR RESCOR?
S6    8520811   TIME? OR TIMING OR INTERVAL? OR DURATION? OR PERIOD? OR DA-
             ILY OR WEEKLY OR HOURLY OR SCHEDULE?
S7          2   S2 AND S3
S8         15   S2 AND S4 AND S5 AND S6
S9         52   S2 AND S5 AND S6
S10         5   S1 AND S3 AND S5 AND S6
S11        59   S7 OR S8 OR S9 OR S10
S12        47   RD (unique items)
S13        35   S12 NOT PY>2000
S14        35   S13 NOT PD=20000728:20020728
File   8:Ei Compendex(R) 1970-2004/Feb W5
         (c) 2004 Elsevier Eng.  Info. Inc.
File  35:Dissertation Abs Online 1861-2004/Feb
         (c) 2004 ProQuest Info&Learning
File 202:Info. Sci. & Tech. Abs. 1966-2004/Feb 20
         (c) 2004 EBSCO Publishing
File  65:Inside Conferences 1993-2004/Mar W1
         (c) 2004 BLDSC all rts. reserv.
File   2:INSPEC 1969-2004/Feb W5
         (c) 2004 Institution of Electrical Engineers
File  94:JICST-EPlus 1985-2004/Feb W5
         (c)2004 Japan Science and Tech Corp(JST)
File 111:TGG Natl.Newspaper Index(SM) 1979-2004/Mar 08
         (c) 2004 The Gale Group
File 233:Internet & Personal Comp. Abs. 1981-2003/Sep
         (c) 2003 EBSCO Pub.
File   6:NTIS 1964-2004/Mar W1
         (c) 2004 NTIS, Intl Cpyrght All Rights Res
File 144:Pascal 1973-2004/Feb W5
         (c) 2004 INIST/CNRS
File  34:SciSearch(R) Cited Ref Sci 1990-2004/Feb W5
         (c) 2004 Inst for Sci Info
File  99:Wilson Appl. Sci & Tech Abs 1983-2004/Feb
         (c) 2004 The HW Wilson Co
```

14/5/3 (Item 3 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

02570966 E.I. Monthly No: EI8805048834
Title: AUTOMATIC ORGANIZATION OF WORD SPOTTING REFERENCE PATTERNS.
Author: Kawabata, Takeshi; Kohida, Masaki
Corporate Source: NTT, Jpn
Source: Review of the Electrical Communication Laboratories (Tokyo) v 35 n 6 Nov 1987 p 681-686
Publication Year: 1987
CODEN: RELTAN ISSN: 0418-6338
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical); X; (Experimental)
Journal Announcement: 8805
Abstract: A word spotting process has been developed which takes account of the **duration change** characteristics for stable and transient parts of speech and uses a segment- **duration** -controlled DP matching algorithm. A word spotting reference pattern is represented by a sequence of phoneme-like segments together with the minimum and maximum permissible **durations** and a typical spectrum for each segment. This paper proposes a new method for automatically **updating** the reference pattern through a learning process. The word detection **rate** for seven **keywords** frequently appearing in thirteen sentences spoken by five speakers was 94. 2% without the learning process and 97. 9% with the learning process. (Author abstract) 5 refs.
Descriptors: *SPEECH--*Recognition; SYSTEMS SCIENCE AND CYBERNETICS--Learning Systems
Identifiers: WORD SPOTTING REFERENCE PATTERNS; KEYWORD DETECTION; REFERENCE PATTERNS SEGMENTATION
Classification Codes:
751 (Acoustics)
75 (ACOUSTICAL TECHNOLOGY)

14/5/4 (Item 4 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

02227089 E.I. Monthly No: EIM8702-008111
Title: WORD SPOTTING METHOD TAKING ACCOUNT OF DURATION CHANGE **CHARACTERISTICS FOR STABLE AND TRANSIENT PARTS OF SPEECH.**
Author: Kawabata, Takeshi; Kohda, Masaki
Corporate Source: NTT, Musashino, Jpn
Conference Title: ICASSP 86 - Proceedings, IEEE-IECEJ-ASJ International Conference on Acoustics, Speech, and Signal Processing.
Conference Location: Tokyo, Jpn Conference Date: 19860407
Sponsor: IEEE Acoustics, Speech, and Signal Processing Soc, New York, NY, USA; Inst of Electronics & Communications Engineers of Japan, Jpn; Acoustical Soc of Japan, Jpn
E.I. Conference No.: 08988
Source: Proceedings - ICASSP, IEEE International Conference on Acoustics, Speech and Signal Processing 1986 Publ by IEEE, New York, NY, USA. Available from IEEE Service Cent (Cat n 86 CH2243-4), Piscataway, NJ, USA p 2307-2310
Publication Year: 1986
CODEN: IPRODJ ISSN: 0736-7791
Language: English
Document Type: PA; (Conference Paper)
Journal Announcement: 8702
Abstract: The authors describe a word-spotting method which takes into consideration the **duration change** characteristics of stable and transient parts of speech. An isolated word to be used as a reference pattern is divided into phonemelike segments which have minimum and maximum permissible segment **durations** . The authors propose two techniques for setting segment **durations** , one based on phoneme-context rules and the other on supervised learning. The word-spotting process is carried out using a segment- **duration** -controlled **dynamic** -programming algorithm. The word detection **rate** for 7 **keywords** in 13 sentences spoken by 5 speakers was 94. 2% using the rule-based method and 96. 9% using the supervised-learning method. 4 refs.
Descriptors: SPEECH--*Processing; MATHEMATICAL PROGRAMMING, **DYNAMIC** ; MATHEMATICAL TECHNIQUES--Algorithms
Identifiers: WORD-SPOTTING PROCESS; **DURATION CHANGE** CHARACTERISTICS; ISOLATED WORD REFERENCE PATTERN; SEGMENT- **DURATION** -CONTROLLED **DYNAMIC** -PROGRAMMING ALGORITHM; RULE-BASED AND SUPERVISED-LEARNING METHODS
Classification Codes:
751 (Acoustics); 921 (Applied Mathematics)
75 (ACOUSTICAL TECHNOLOGY); 92 (ENGINEERING MATHEMATICS)

14/5/8 (Item 1 from file: 2)
DIALOG(R)File 2:INSPEC

6794858 INSPEC Abstract Number: C2001-02-7250R-044
Title: Group-oriented paper retrieving and filtering
Author(s): Minghua He; Xudong Luo; Ho-Fung Leung; Yuhui Qiu
Author Affiliation: Dept. of Comput. Sci. & Eng., Chinese Univ. of Hong Kong, Shatin, China
Conference Title: Proceedings of the ISCA 9th International Conference Intelligent Systems p.31-4
Editor(s): Page, D.; Graham, J.
Publisher: Int. Soc. Comput. & Their Appl. - ISCA, Cary, NC, USA
Publication Date: 2000 Country of Publication: USA iv+158 pp.
ISBN: 1 880843 33 1 Material Identity Number: XX-2000-01467
Conference Title: Proceedings of ISCA 2000: Ninth International Conference on Intelligence Systems: Artificial Intelligence Applications for the New Millennium
Conference Sponsor: Int. Soc. Comput. Applications - ISCA
Conference Date: 15-17 June 2000 Conference Location: Louisville, KY, USA
Language: English Document Type: Conference Paper (PA)
Treatment: Practical (P); Experimental (X)
Abstract: We develop a multi-agent system, PRF, for paper retrieving and filtering for a research group in which each member has similar research interests and preferences. Concretely, the system receives the query keyword from users, then tries to collect related papers from various distributed sources on the Web, and finally presents the users the result in the form of a homepage. Thus, the user browses the homepage, follows the links of every paper and gives feedback on relevant or irrelevant. The system can learn about the group's profile by getting feedback from the users and by **modifying** the **weight** of the profile **keywords** . Moreover, as the system evolves over **time** , it can adjust itself according to the interests and preferences of the group of research members. The result of the experiments show that our system can get more exact retrieved results than some of previous systems. (8 Refs)
Subfile: C
Descriptors: information needs; information resources; information retrieval; Internet; learning (artificial intelligence); multi-agent systems
Identifiers: group-oriented information retrieval; multi-agent system; PRF; information filtering; user preferences; query keyword; homepage; World Wide Web; relevance feedback; learning; paper retrieval; experiments
Class Codes: C7250R (Information retrieval techniques); C6170 (Expert systems and other AI software and techniques); C1230 (Artificial intelligence); C7210N (Information networks)

14/5/9 (Item 2 from file: 2)
DIALOG(R)File 2:INSPEC

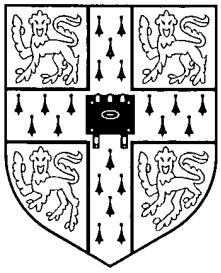
6003016 INSPEC Abstract Number: C9810-6170K-003
Title: Optimal realisation of a large scale knowledge base for measuring semantic similarity between words
Author(s): Ishikawa, T.; Izawa, J.; Ha, N.V.; Kasahara, K.
Author Affiliation: Fac. of Eng., Takushoku Univ., Tokyo, Japan
Journal: Journal of Japanese Society for Artificial Intelligence vol.13, no.3 p.470-9
Publisher: Japanese Soc. Artificial Intelligence,
Publication Date: May 1998 Country of Publication: Japan
CODEN: JCGAED ISSN: 0912-8085
SICI: 0912-8085(199805)13:3L.470:ORLS;1-F
Material Identity Number: K566-98002
Language: Japanese Document Type: Journal Paper (JP)
Treatment: Theoretical (T); Experimental (X)
Abstract: This paper discusses an optimal structure of a large scale knowledge base of words, which is automatically constructed from machine-readable dictionaries. In this knowledge base, each word is represented by a series of **weighted keywords** . The **keywords** have some relationship with the word, and the **weights** of the **keywords** represent the degree of the strength of the relationship between the word and keywords. Our analysis, using a simplified model of the knowledge base based on the probability theory, has shown that a smaller keyword set using the higher level keyword in the conceptual hierarchy becomes optimal when the size of the knowledge base becomes large. On the other hand, an experiment using six knowledge bases **modified** from the previously constructed knowledge base of 40,000 Japanese **daily** -used words has verified the existence of the optimal keyword set. This means that the above mentioned analysis is useful in the design of a knowledge base in which each word is generally represented by a vector. (20 Refs)
Subfile: C
Descriptors: glossaries; inference mechanisms; knowledge based systems; probability
Identifiers: large scale knowledge base; semantic similarity; word knowledge base; dictionaries; keywords; probability; **daily** used words; conceptual hierarchy; common sense; analogue reasoning
Class Codes: C6170K (Knowledge engineering techniques); C1230 (Artificial intelligence); C7240 (Information analysis and indexing); C1140Z (Other topics in statistics)

14/5/14 (Item 3 from file: 94)
DIALOG(R)File 94:JICST-EPlus

03571635 JICST ACCESSION NUMBER: 98A0499997 FILE SEGMENT: JICST-E
An Index Navigator: Understanding and Expressing User's Changing **Interest.**
OSAWA YUKIO (1); SUGAWA ATSUSHI (1); YACHIDA MASAHIKO (1)
(1) Osaka Univ., Grad. Sch.
Jinko Chino Gakkaishi(Journal of Japanese Society for Artificial Intelligence), 1998, VOL.13,NO.3, PAGE.461-469, FIG.6, REF.14
JOURNAL NUMBER: X0330AAH ISSN NO: 0912-8085
UNIVERSAL DECIMAL CLASSIFICATION: 002.5:005 681.3:007.51
LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan
DOCUMENT TYPE: Journal
ARTICLE TYPE: Original paper
MEDIA TYPE: Printed Publication
ABSTRACT: It is important to guide a user to interesting documents in a large-scale document-database. However, when the user is not an expert of the area of his/her new interest, it is difficult for the user to name precise keywords in which he/she is interested, nor to select areas of his/her own interest. This paper presents an Index Navigator which clarifies what areas the user is interested in, what keywords he/she should investigate, and what documents concern his/her interest. A tough problem for such a system is to understand interesting areas for the user, among other areas-sets which can explain his/her behaviors. Our Index Navigator employs an inference method called Cost-based Cooperation of Multiple Abducers (CCMA), for understanding user's interest from the history of the user's expression of interest in insufficient keywords, even if the **changing** speed of the user's interest is totally unknown. With this device, the Index Navigator guides the user to really **important** areas, **keywords** and documents. (author abst.)
DESCRIPTORS: document retrieval; hypothetical reasoning; knowledge representation; tree(graph); keyword; interest(concern); **time** course; **time** series analysis
BROADER DESCRIPTORS: information retrieval; retrieval; inference; representation; subgraph; graph; vocabulary; variation; analysis(separation); analysis
CLASSIFICATION CODE(S): AC06020S; JE08000Z

MPhil Computer Speech and Language Processing
Speech Recognition Essay

Describe What is Meant by the Term "Keyword Spotting" and Describe the Techniques Used to Implement Such a Recognition System.



Sue Johnson
email sej28@eng.cam.ac.uk

April 24, 1997

Contents

1 Introduction

In recent years many technological advances have been made in speech recognition. Speech-driven word-processors are becoming increasingly commercially viable as very large vocabulary, speaker-independent continuous speech recognition systems continue to improve. Such systems are a far cry from the original limited-vocabulary, speaker-dependent isolated word recognisers, but their inherent complexity and excessive amount of necessary training make them unsuitable for certain applications.

Take for example, the case of trying to route telephone calls automatically to the correct department in a large store. Isolated word recognition would provide a computationally inexpensive and quick way of distinguishing between "books" and "toys", but is unfortunately rather too restrictive on what it allows the speaker to say as it forces them to talk in an un-natural way using only pre-designated words.

Using a continuous speech recogniser would certainly overcome this problem, but would introduce new difficulties. The system would have to identify every word in the utterance, then perform syntactic and semantic analysis in an attempt to extract the meaning of the request from the utterance. Such a procedure would be computationally expensive, rather slow and, as it turns out, largely unnecessary. A compromise between the two systems is needed.

Most of the calls to the system would be of the form, "Can you put me through to the toys section please", or "I want to speak to someone in the books department". By simply looking for occurrences of the words "books" or "toys" within the speech, a simple and fast yet syntactically unrestrictive system can be built with no loss of performance.

This method of speech analysis is called keyword-spotting and will be discussed in detail in this essay. Initially a definition of keyword-spotting will be given along with a description of several word-spotting applications. A discussion of the evaluation and implementation of different types of keyword-spotters will then be given followed by conclusions about the word-spotting methods mentioned.

2 What is Keyword Spotting?

2.1 A Definition of Keyword Spotting

Keyword spotting is the task of identifying the occurrences of certain desired *keywords* in an arbitrary speech signal. Word-spotters overcome the syntactic restrictions of isolated word recognition by making no assumptions about the overall speech whilst exploiting significantly less computationally complex systems than continuous speech recognisers, since no attempt is made to understand the whole speech signal. This allows a significant increase in speed of operation and reduction in the amount of necessary training.

Keyword-spotting therefore involves picking out salient information from a speech signal by locating a relatively small number of keywords embedded in some arbitrary conversation which may contain a theoretically infinite set of words and non-word noise. The word-spotter makes no assumptions about the nature of the non-keyword speech, or the syntax of the utterance. This allows truly natural conversational speech to be used, which may include hesitations, coughing, false-starts and other phenomena not normally modelled in continuous speech recognition.

The identification of the keyword usually involves generating a list of putative hits which specify the location of the start of the keyword utterance and a probability associated with this hypothesis being correct. This is illustrated in figure 1.

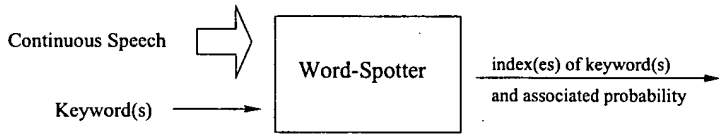


Figure 1: Basic Representation of a keyword-spotter

2.2 Potential Applications for Keyword Spotting

Uses for keyword spotting extend far beyond simple telephone routing systems. The main potential applications for accurate keyword spotters are summarized below.

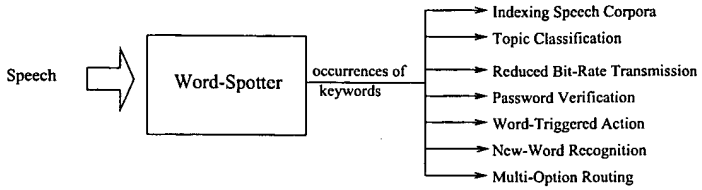


Figure 2: Some Potential Uses for Keyword Spotting

- Indexing into Recorded Speech
  Recording speech provides an easier way of storing information than having to write the transcript down. An individual could use a dictaphone to record his own thoughts on a problem, or those of others for example in a lecture or meeting. For speech to supersede the use of written text as a storage mechanism, efficient methods of allowing the user direct access to a given point in the recording must be devised. Word-spotting allows an added dimension to the traditional sequential play-back of audio recordings. By locating and subsequently storing the time index of the occurrences of certain keywords within the speech, finding these words simply reduces to jumping directly to the required index in the recording.

  Since the speaker on the recording is generally known beforehand and does not change, a speaker-dependent system could be used. The keywords however are generally unknown and therefore a large, variable keyword vocabulary is needed. Such a system could also be used to assist a speech-based editor in locating keyword instances to allow the deletion, substitution and insertion of words. [21]

- Classification of Speech Messages
  The recent developments in speech messaging and voice-mail systems necessitate an ability to summarize speech information to prevent the recipient having to listen to irrelevant messages. A keyword spotter can be used to generate a list of the frequency of occurrence of various predefined keywords in the speech. This information can then be processed by a message-classifier to ascertain the likely topic of the message, thus facilitating user review. [20] Such a system needs only a small fixed keyword vocabulary if the likely message topics are known in advance, but must be speaker independent to allow messages from any speaker.

- Bit-rate reduction - Filtering Information
  Speech often contains much redundant information. Certain so-called "noise" words may appear frequently in the speech without adding much to its meaning. For transmission or storage of speech data, when compression of the speech is critical, a very large vocabulary keyword-spotter can

be used to "filter out" such words to improve compression ratios without incurring any significant loss in information content.

- Response Verification
  Several systems need to perform some verification of a speech response. Password recognition could be done by an isolated word recogniser, but using a keyword spotter allows more complicated password-phrases to be devised and provides more flexibility to the speaker by allowing phenomena such as coughing or silence. Radio or TV quiz phone-in lines could also use a keyword-spotter to automatically identify those calls containing the correct answer(s). Such a system must be speaker-independent and requires a small but flexible keyword vocabulary.

- Word-based Commands
  Spotting keywords in real-time can also allow actions to be performed. If a speaker-dependent small vocabulary keyword spotter were constantly running in the background in a house, then the user could ask for the lights to be turned on, or the TV channel changed within a normal speech conversation. Another example is running a background keyword-spotter on a TV or radio broadcast, so that when an "interesting" event occurs, such as the commentator on a football match shouting "goal", then the video will automatically switch on to record the replay.

- Number Extraction
  Often the desired information in a speech phrase consists of a series of numbers such as a phone number or serial-code identification. By running a keyword-spotter such information could be extracted without regard for the surrounding "padding" of the speech.

- New-Word Recognition (considering occurrences of non-keywords)
  Speech-driven word-processors will make mistakes if a word is encountered which is not in the known vocabulary. By defining all the words in the vocabulary as keywords, a word-spotter can be used to detect the occurrence of new words automatically by signaling when no keyword has been recognised in the speech. [2]

These applications are summarized in following table.

Application	**Speaker Dep/Indep**	**Small/Large/Huge $N°$ of keywords**	**Fixed/Variable keyword vocab**	**Real-time/ Pre-processed**
Indexing Speech	D or I	L	V	P
Classifying Messages	I	S	F	P
Bit-rate Reduction	D or I	H	F	P
Telephone Routing	I	S	F	R
Response Verification	I	S	V	P
Word-based Commands	D or I	S	F	R
Number-extraction	I	S	F	P
New-word recognition	D or I	H	F	P or R

2.3 Evaluating Keyword Spotting Performance

A word-spotter generates a series of putative "hits" from the speech signal, which represent possible keyword occurrences. Two types of error may result from these hits. Type I error is when a true keyword exemplar in the speech is not recognised by the word-spotter. Type II error is when the word-spotter generates a false alarm by seemingly recognising a keyword when there was none present in the original. There is naturally a trade off between these errors, with a reduction in the number of missed keywords occurring at the expense of a higher false alarm rate. This trade off is represented by the *operating point* of the system.

The keyword detection rate P_d is defined as the number of correct putative hits from the word-spotter divided by the number of keyword occurrences in the original speech sample. The false alarm rate (FAR) is defined as the number of false alarms per hour of speech normalised by the number of different keywords being considered. The FAR is thus measured in false alarms per keyword per hour (FA/KW/HR). By determining the detection rate for different false alarm rates a receiver operating curve (ROC) can be drawn. A typical ROC is shown in figure 3.

False alarm rates below 10 FA/KW/HR are of most interest since the system would seldom be run above this point and the overall performance tends to a steady-state response. The NIST Figure of Merit (FOM) for evaluating keyword spotting performance is defined as the average probability of keyword detection over the range of 0-10 false alarms per keyword per hour. This FOM proves to be relatively independent of the word-spotter's operating point and provides a standard to compare different word-spotting systems.

$$FOM = \frac{1}{10} \int_{0\,FA/KW/HR}^{10} P_d \; d(FAR).$$

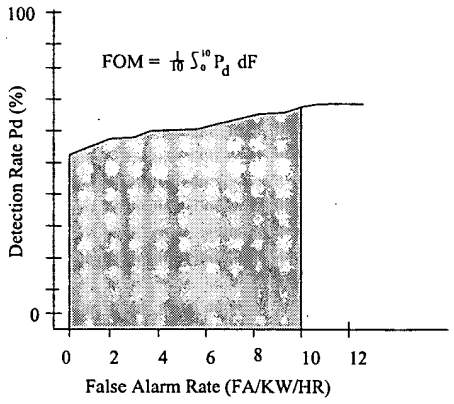


Figure 3: Typical Receiver Operating Curve (ROC) for Keyword Spotting

3 Techniques for Implementing Keyword Spotters

3.1 A General HMM-based Keyword Spotting System

Template matching using dynamic time warping offers a possible method of modelling speech information. However, HMM-based systems are generally superior at modelling the acoustic variability which occurs between different utterances of the same word and offers a more natural extension to modelling non-keyword speech through maximum-likelihood training.

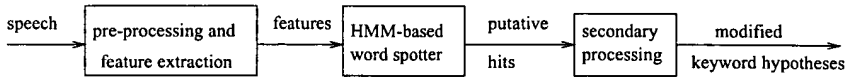


Figure 4: Overall Architecture for an HMM-based Keyword Spotter

Figure 4 shows the overall architecture of a keyword-spotter. The same principles would apply if the central HMM-based word-spotter were replaced by any fundamental speech recognition technique, such as template-based dynamic time warping connected speech recognition or recurrent neural networks, but this essay will concentrate on HMM-based systems as they are the most popular and successful at present.

3.2 The Keyword/Filler Word-Spotter Implementation

A representation of a simple HMM-based keyword classifier is given in figure 5.

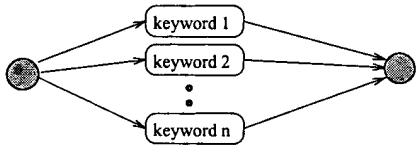


Figure 5: A simple keyword classifier

Each keyword is modelled as an individual HMM. Since it is often beneficial to allow more than one keyword to be defined, the individual keyword-models are placed in parallel, thus enabling any keyword to be recognised by the classifier. To extend this idea to allow sequences of words to be recognised, the start and end node of the model (shaded in figure 5) are made into grammar nodes and a null transition [1] is added from the right to the left grammar node. This can now be considered as a small vocabulary continuous speech recogniser.

[1] i.e. one which takes no time and produces no output

This network can be used to identify the most likely sequence of keywords in the speech sample. It could also theoretically be used as a basic keyword-spotter. It could certainly distinguish between the keywords, and by thresholding the likelihood of the keyword occurring, a primitive means of rejecting false-alarms, and thus modelling non-keyword speech could be implemented. This approach, however, has a major flaw. Absolute values of the likelihood of the keyword occurrences are influenced by the noise and channel characteristics of the recording. A method of normalising for these effects is required. This is implemented by including models which represent non-keyword speech, so a comparison of the two can be made before declaring the putative hits.

In order to model the non-keyword speech explicitly, an alternative path through the network is thus incorporated. This is generally called a *filler* or *garbage* model. Some systems also add extra models for non-speech events, such as coughing, laughter or silence. The resulting general HMM-based keyword-spotter is illustrated in figure 6.

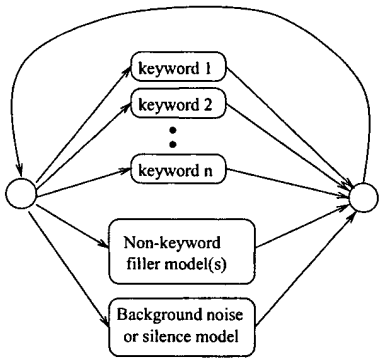


Figure 6: A general HMM-based Keyword Spotter

Sometimes inter-word transition weights are added to the paths through the network. [19] These can be used to adjust the operating point of the system by penalising certain paths, thus altering the detection probability and false alarm rate of the word-spotter.

The methods of implementation and the resultant performance of this generic word-spotter are greatly affected by many different parameters, including

- Choice and number of keywords. [7, 21]
- Choice of language model. [7, 18]
- Choice of feature vector from the speech signal. [17]

- Method of modelling keywords. [18]
- Method of modelling and the nature of non-keyword speech. [18, 19]
- Training methods and available training data. [15]
- Choice of scoring system in generating putative hits. [18]
- Including secondary processing to reduce false alarm rates. [11, 20]

Each of these will be discussed in turn in the following section.

3.3 Improving the performance of the HMM-based word-spotter

3.3.1 Choice and Number of Keywords

Some applications, such as password verification, allow a completely unconstrained choice of keyword. In these cases the keywords can be chosen to maximise word-spotter performance by considering the length and acoustic content of both the keyword and non-keyword speech.

Mono-syllabic words are generally a poor choice for keywords as word-spotter performance has been shown to increase with the number of syllables in a given keyword. [21] This includes both a higher detection probability generally and a lower false alarm rate given a constant probability of detection. This suggests phrases rather than single words could increase performance further. Increasing the length of a keyword also reduces the likelihood of spurious hits due to the keyword being a sub-string of a different word such as "class" and "classification".

Choosing keywords which are not phonetically similar to other words in the speech will obviously improve performance. "Isocrates" is a good choice of keyword [7] as it does not sound like any other English word, whereas "pact" may well be mis-identified as "backed" or even "pecked".

For information retrieval applications such as the classification of video-mail, further constraints on keyword-choice increase the overall system performance (although not necessarily the word-spotting FOM). [2] These include the frequency of occurrence of the chosen keyword and its relevance and exclusivity to the topic it represents.

Both the number and flexibility of keywords needed in a given application affects the method used in implementation and the operating speed of the resulting word-spotter.

[2] see section 3.3.8

3.3.2 Choice of Language Model

Most word-spotters use a null grammar which allows a completely unrestrained syntax in that any word can follow any other with equal probability. This is certainly more applicable for word-spotting than general continuous speech recognition, as the comparative rarity of keyword occurrences in most word-spotting applications means less grammatical and syntactical information is available to help restrict the possible word combinations.

It has been shown [18], however, that in some very restricted circumstances incorporating a statistical language model into the keyword spotter can increase performance. In the unlikely event that the available training data has the same word-sequence statistics as the target data and a large vocabulary type keyword spotter is being used, then statistical language data may be included in the system. Rohlicek [18] showed an increase of 6.6% in the FOM using a bigram model instead of the traditional null-grammar model used for keyword spotting.

The simple grammar shown in figure 7 has been shown [7] to improve performance on voice-activated applications, where the likelihood of the keyword being surrounded by momentary silence is quite high.

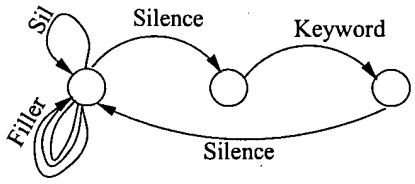


Figure 7: The simple grammar model for voice-activated systems

3.3.3 Choice of Feature Vector

Before the speech can be analysed it must be converted into a compact representation. This is called a feature vector. These features can be frame-based [17, 20] or segment-based. [11] Several possible properties of the speech can be used as features. Ideally they should be robust, sufficient and complete in that they should encapsulate all the information about the speech with the minimum of redundancy and insensitivity to noise.

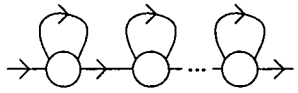
Telephone speech is generally sampled at 10kHz and band-limited to 300-3300Hz before feature extraction. [11, 17, 19] Mel-spaced samples of a log LPC power spectrum have been used as features but were found to produce poorer performance than that obtained with Mel-frequency cepstral coefficients and their derivatives. [3] [17]

[3] Including derivatives improves the performance of the word-spotter for several different feature vectors [17]

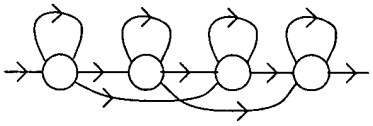
The distribution of the features can be normalised over a single speaker in an attempt to counteract inter-speaker variability, but this has been shown to have no effect when cepstral coefficients are used. [17] Energy normalisation however is often used to reduce the effect of short-term energy variations and compensation for channel and speaker variability is performed by a simple subtraction on the cepstral vector. [18, 19]

3.3.4 Method of Modelling Keywords

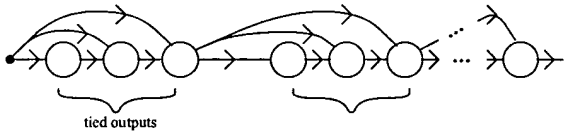
The first HMM-based word-spotters used whole-word models to represent the keywords. [17, 21] These word models are left-right (or Bakis) HMMs and generally have three states per phoneme, although the detailed topology of the model has often been altered in an attempt to increase word-spotter performance. [17]. The most common representations of a whole-word keyword model are given in figure 8, along with an alternative which has been proposed.



Model A: Simplest LR HMM



Model B: Most Commonly Used Model



Model C: Explicitly Models Word-Segment Duration

Figure 8: Possible HMMs for modelling whole-keywords

Model C attempts to model the duration of the phonemes explicitly, rather than relying on the internal dynamics of the model. When combined with an increase in the number of output distributions, this model has been shown to improve a basic keyword-spotter's performance significantly. [17] Model B, however, continues to be the most popular.

To allow for very large keyword vocabularies and keyword variants which do not appear in the training data [4] keywords can be represented by sub-word models. [19] This allows training information to be shared when building the keyword models, but permits the possibility of a sub-word unit being inserted,

[4] e.g. you may have the keywords "football", "manage" and "manager" in the training data, but want to allow the keyword "footballer".

deleted or substituted in the correct keyword sub-word sequence. This is especially significant if sub-word units are used for the filler model. To compensate for this, transition penalties can be added to the network to try to discourage jumps between the keyword and filler model. [3]

Another choice can be made between regarding the output distribution of the HMMs. Vector Quantization (VQ) can be used to form a finite set of codebook vectors to represent the speech. This is computationally simpler but generally does not model the speech as well as the alternative continuous mixture of Gaussians. Some Gaussian-mixture based systems use diagonal covariance matrices [10, 17] or *tied states* [12] in an attempt to reduce the number of unknown parameters to be trained. This increases training speed and system performance if limited training data is available. Either system can be used for both whole-word and sub-word keyword and filler models, but using both methods in the same system is unadvisable.

These points are summarized in the table below.

Property	**+/-**	**Comment**
Whole-word Model	+	Needs no phonetic knowledge of keyword (lexicon)
	+	Does not allow sub-word insertion/deletion or substitution
	+	Allows better discrimination against sub-word filler models
	+	Performs better when few training tokens are available [17]
Sub-word Model	+	Allows very large keyword vocabulary
	+	Makes it easier to change the keyword vocabulary
	+	Permits information sharing in training
	-	Requires a lexicon and transcribed training data
Mixture Gaussian	+	Models the speech better than using VQ.
	-	Has many unknown parameters to be trained.
VQ (discrete)	-	Accuracy lost when forming codebook vectors
	+	Computationally simpler than Gaussian mixture.

3.3.5 Method of Modelling and the Nature of Non-keyword Speech

The performance of a keyword-spotter relies heavily on the ability of the filler model to accurately represent arbitrary non-keyword speech. [19] For optimum performance, the filler(s) must match the speech significantly more closely than the keyword HMM network does if, and only if, the speech is not a keyword.

Several ideas for implementing such a filler model have been proposed. Which implementation to use depends on many factors, including the purpose of the keyword-spotting, the a-priori knowledge of the input speech, the amount of training data available, the type of modelling used for the keywords and the desired operating point of the word-spotter. When evaluating the relative merits of each implementation, the effect on overall word-spotter performance, the system's computational complexity, the required knowledge of the speech and

the type and amount of necessary training data should be considered.

For word-spotting applications with a known and restricted vocabulary input, it is possible to use a large vocabulary speech recogniser as a word-spotter. This effectively uses the parallel combination of all non-keywords as the filler model network. By only looking for the occurrences of the keywords, the output word-sequence can be converted into a set of putative hits. Such a system could be used in message-classification, word-filtering and speech-data compression.

Using a large vocabulary speech recogniser allows a statistical language model to be incorporated in place of the traditional null-grammar of keyword-spotters to help improve performance. However, the system results in an extremely large network and relies on the non-keyword vocabulary being known beforehand. The main principle behind keyword spotting is that the speech does not have to be deciphered exactly (a very computationally expensive task), but rather that the keywords should be picked out without concern as to the manner of the rest of the signal. This means the signal could contain any words, or non-keyword sounds such as coughing, silence or music. Running a large-vocabulary recogniser as a word-spotter moves away from this principle by assuming that the characteristics of the non-keyword speech are known. The system also needs a huge amount of initial training to produce all the models for the keywords and non-keywords. For these reasons, despite the fact that modelling non-keywords in parallel is obviously a good model for non-keyword speech and having all the possible words modelled allows the keywords to be changed without further retraining, I do not think large-vocabulary recognition has a significant place in keyword-spotting.

For more typical systems, the non-keyword vocabulary is very large [5] and the amount of training data available is limited, implying a more general filler or *garbage* model should be used to model non-keyword speech. In general, most of the non-keyword utterances in the speech will not have been contained in the training set. Some method, therefore, of breaking down the words to allow shared models must be found. This can be accomplished by using sub-word models to represent non-keyword speech rather than the whole-word models of the large vocabulary recogniser. This approach is especially beneficial if the keywords are already modelled using sub-word units.

Rohlicek et al. [17] tried using segments of keywords in parallel as a filler model. This had the advantage of not requiring additional training, as the keyword model parameters could be re-used. This approach proves useful when only keyword speech is available for training, but significantly better performance is obtained if non-keyword speech is used to train the filler models.

[5] indeed, theoretically infinite for an ideal keyword spotter

One possible closed set of sub-word models are general-context phones. [20] English has around 53 distinct monophones which can model arbitrary speech if placed in parallel. This is useful when minimizing recogniser complexity is important. Rose and Paul [19] show that a general-context monophone-based system performs only slightly less well than a triphone system (60.6% to 61.3%) despite its inherent increased recogniser simplicity. Problems with co-articulation effects however, often make context-dependent phones (such as triphones) more successful filler models. [2]

Tri/diphone models require more computation that monophone models, as they allow more possible sequences through the network, but generally match the non-keyword speech better. The highest performance using triphones as filler models occurs when no triphones from the keyword(s) appear in the filler model, as the chance of misclassification of a keyword as a filler in this case is minimized.

The models discussed above assume some knowledge of the keywords in order to train the non-keyword filler model. If all the sample speech, rather than just the non-keyword speech, is used to train the filler model then the model becomes vocabulary-independent and does not need retraining if a new-keyword is added to the system. Indeed Wilcox and Bush's word-spotter required only a single utterance of a new keyword to produce the keyword model, thereby allowing dynamic specification of keywords at run-time using this approach. [21] The performance is of course worse than systems where the keywords and non-keywords have been totally separated before training, but the increased flexibility of the system generally outweighs this disadvantage. The amount of degradation in performance is a function of the number of keyword and non-keyword occurrences in the training data and the similarity between the resultant models.

The optimum size of the filler model also depends on the choice of keyword modelling. Generally shorter models in a null-grammar network offer a larger variety of paths hence increasing the likelihood of matching a non-keyword event. However, more computation is needed to calculate these paths, and if sub-word units are used in keyword modelling, the probability of spurious filler insertions is increased as the size of filler unit decreases. In such a system penalties can be included to discourage transitions between the keyword and filler networks. If whole-word keyword models are being used, which impose additional sequential constraints on the sub-word units, several genuine keyword occurrences may be rejected by a sub-word filler model word-spotter.

If the word-spotter may need to be reconfigured frequently or no orthographically transcribed speech is available for training, then unsupervised clustered learning on unlabeled data can be used to produce an alternative filler model. Such a system however provides a relatively poor model of non-keyword speech, resulting in a high FAR and low-performance of the word-spotter. Unsupervised training will always produce worse performance than that obtained using

transcribed data, but remains a possibility when no transcribed training data is available.

In addition to filler models of non-keyword speech, the inclusion of a background model can increase word-spotter performance. This is used as a base to compare the keyword/filler score and accounts for the variability in factors such as channel effects and volume level, when included in the scoring system. [6]

Chigier [5] uses two "sink" models to absorb the non-keyword signal. One models a non-speech event, whilst the other models speech which does not contain keywords. Each model allows for "words" between two and seven segments long and is illustrated in figure 9 where M represents a series of 3 acoustic models for the non-speech and 15 for the non-keyword speech sink model. These acoustic models are not used anywhere else in the system thereby ensuring the phone models for the keyword speech are not corrupted.

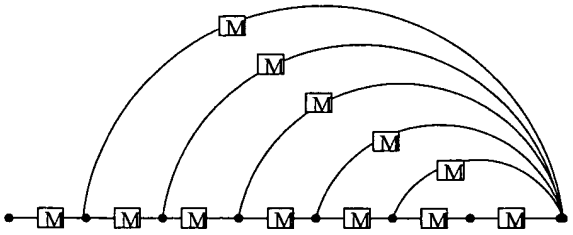


Figure 9: A Sink Model for Non-Keyword Events

3.3.6 Training Methods and Available Training Data

The amount and type of available training data affects the choice of keyword and filler models as discussed in the previous section. If limited training data is available, then the performance of the system can be improved by artificially transforming the available speech to increase the variability of the training data without necessitating additional data collection. [4]

If labelled training data is available standard Baum-Welch training is generally used to determine the parameters of the HMMs. [16] Alternatively fuzzy clustering may be used to learn the mean and covariance matrices for a mixture of Gaussians if the amount of training data is limited. [21]

Error-corrective training offers an alternative to the maximum likelihood approach and has been shown to improve performance when used in isolated phoneme recognition, [15] but is not generally used in training the primary stage

[6] discussed further in section 3.3.7

of word-spotters. Tree-based clustering can also be used in training sub-word HMMs which use many tied states thus allowing a large number of sub-word units to be modelled in a relatively compact way. [8] Vector Quantization is generally used if a discrete system is required.

The best performance is obtained if truly spontaneous conversational speech is used for training, rather than the traditionally read speech. [19] This is because if the training data includes events such as coughing, silence and false-starts it is more likely to be representative of the target speech.

3.3.7 Choice of Scoring System in Generating Putative Hits

There are two main methods of generating putative hits as the speech is analysed by the word-spotter. The first involves generating a score which represents the likelihood of a keyword occurring at a given instant in time. This score can then be processed in a number of ways, the simplest being to pass it through a simple thresholder, in order to ascertain whether a putative hit has occurred. The second method is a Viterbi pass to generate the most likely sequence of fillers/keywords in the utterance.

One of the first scoring methods used in word-spotting to help determine putative hits was a duration-normalised likelihood function:

$$L_n(t) = p(x_{t-d+1}, ..., x_t | word\ n)^{1/d}$$

Where d is an estimate of the duration of the *word* n. This was not very successful and was superseded by using an *a posteriori* probability which gave approximately 5 times higher detection probabilities. [17]

The probability of being in state i at time t, with the observation sequence $x_1, ..., x_t$ given the model M, is given by:

$$\alpha_i(t) = p(s_t = i, x_1, ..., x_t | M)$$

These coefficients can be calculated recursively using the standard forward algorithm for HMMs. [16]

$$\alpha_j(t) = \left[\sum_{i=1}^{N-1} \alpha_i(t-1)\, a_{ij} \right] b_j(x_t)$$

where a_{ij} represents the transition probability from state i to state j and $b_j(x_t)$ represents the probability of observing x_t given the state j.

The *a posteriori* probability of the nth keyword ending at time t is thus simply:

$$E_n(t) = Pr(s_t = e_n | x_1, ...x_t) = \frac{p(s_t = e_n, x_1, ..., x_t)}{p(x_1, ..., x_t)} = \frac{\alpha_{e_n}(t)}{\sum_j \alpha_j(t)}$$

where the sum is over the states in the network and e_n is the final state in the nth keyword. By detecting local maxima in E_n, and applying a thresholder, speculations of the most likely occurrences of the keywords can be made.

This scoring method exploits only a small amount of the potential information from the network and results in a large number of false alarms being generated. This method could be used in applications where false alarms are not very important, but processing in real-time is critical. Generally, however, this is not the case and some post-processing is carried out to try to improve performance by reducing the number of spurious putative hits.

Once the end points of the keywords have been speculated using the forward search, one possible form of post-processing is to use the corresponding backwards coefficients to locate the start of the word and generate a verification score to assist in reducing spurious putative hits. [21] The computational efficiency of the backward coefficient search is increased by only searching when a keyword has been hypothesised. This implicitly assumes that the forward search has a high detection probability and the purpose of the post-processor is simply to reduce the false alarm rate.

The verification score used in [21] is composed of a comparison of duration-normalised backward probabilities for the keyword model and the filler/background model:

$$S(t,t_e) = \frac{L^{key}}{L^{key} + L^{back}}$$

where

$$L^{key}(t,t_e) = P(x_t,...,x_{t_e}|keyword)^{\frac{1}{t-t_e}} = \beta_b(t-1)^{\frac{1}{t-t_e}}$$

and b is the start state of the keyword. The start time is then determined by locating the maximum in $S(t,t_e)$ subject to a constraint on the allowable duration of the keyword.

Alternatively, a combination of the forward and backward scores can be used directly to produce a word score representing the probability that keyword k ends at time t given all the observations. [18]

$$S_{fb}(k,t) = \frac{\alpha(e_k,t)\beta(e_k,t)}{\sum_s \alpha(s,t)\beta(s,t)} \qquad \forall\ end-of-word\ states\ s$$

Time synchronous Viterbi beamsearch decoding can also be used to generate putative hits. [19, 20] The Viterbi algorithm evaluates the most likely state sequence through the speech using the well-known formula:

$$v_j(t) = \max_{1 \le i \le N} v_i(t-1)a_{ij}b_j(x_t)$$

This can be used to ascertain which path between the grammar nodes was taken at any given time and hence which keyword (if any) was recognised.

This information can be used directly to produce a binary-type output of when putative hits have been generated. Alternatively, by storing the probability associated with going from the first state of the keyword-model to the last given the observations and then performing duration-normalisation, a likelihood of the putative hit being correct can be evaluated. This is important if secondary processing to reduce the false alarm rate is going to be used subsequently. Rose and Paul [19] use a score based on a similar argument:

$$S_{KW} = \frac{log\, P(s_{end}, x_{T_{start}}, \cdots, x_{T_{end}})}{T_{end} - T_{start}}$$

They then modified this score by subtracting the corresponding *background* score [7] to give a more representative likelihood ratio, although it has since been shown that better results can be obtained if the ratio rather than the subtraction of the log scores is used. [14]

In order to reduce the delay between the speech entering the keyword-spotter and the putative hits being generated, a partial Viterbi backtrace can be used to identify any states through which all the active Viterbi paths pass simultaneously. The most likely sequence of keywords/fillers can then be evaluated up to that state and the putative hits generated as before. This reduction of delay allows the system to operate almost as quickly as the afore-mentioned forward approach without restricting the scoring to rely on *local* maxima.

The delay will be dependent on how many convergent nodes there are in the network. Generally the frequency of occurrence of these nodes can be increased by using a beam-search to de-activate Viterbi paths with relatively low probabilities without significant degradation in performance. A study of the delays by Rose and Paul found them to be under 3 seconds in all observed examples. [19]

In general a Viterbi path produces only a single operating point of detection rate versus false alarm rate, but by adding variable transition costs to the overall model to penalise certain word sequences, the operating point can be varied and indeed the word-spotter performance improved. [3] It has been shown [18, 22] that given the same mix of false alarms, both the forward-backward and Viterbi state sequence scoring methods give comparable results for word-spotting. The forward-backward search, however, offers a small computational advantage over the Viterbi search as back-tracking is only required when a putative hit has been hypothesised. It has also been shown to run 20% faster than the Viterbi search in one experiment [22] although the increase in speed depends on the frequency of keyword occurrences in the speech.

[7] obtained by passing through the network without the keyword paths

3.3.8 Including Secondary Processing

Secondary processing is a broad term which includes many different procedures for different scoring methods and word-spotting applications. All these methods however share the common goal of trying to improve the list of putative hits to increase the word-spotter's performance. This generally involves attempting to reduce the false alarm rate by removing spurious hits, but can also include trying to recover any keywords which the word-spotter has missed. A simple form of secondary processing using backward verification scores from forward-search putative hits has already been mentioned in section 3.3.7.

Rose [20] uses a word-spotter as an acoustic front end to a speech information retrieval system. He incorporates some secondary processing by introducing a "message-class corrective keyword detector" between the word-spotter and the information-retrieval system, which is designed to compensate for the effect of keyword false-alarms on performance.

Rather than manually classifying all the putative hits as true hits or false alarms and using these as target values to train a maximum-likelihood neural-network based secondary processor, Rose defines an error criterion to be minimized and uses unsupervised learning and back-propagation to train the network to allow modification of the list of putative hits. This eliminates the need to have labelled putative hits, but is application specific in that the maximisation criterion relates to the overall message-classification task and not the word-spotting output. An improvement in the system performance is obtained, but this is clouded by his use of the same data in both training and testing and the lack of generalisation possible from the resulting system.

Gish et al. [11] use labelled putative events from the primary word-spotter to train keyword-specific segmental models of variable duration for a secondary processor which produces a new score. When combined with the primary word-spotting score, the false alarm rate of the overall word-spotter can be reduced and hence the FOM increased. [8]

The aim of the segmental approach is to group together adjacent frames with similar acoustics in an attempt to allow better discrimination between segments than would be possible if only frames were used. Once segmentation has been completed, one mixture model representing a true hit and one for false alarms are generated for each keyword using the relevant *labelled* putative hits and the Expectation Maximisation algorithm. The resulting keyword models are a conglomeration of the appropriate segment mixture model, segment transition model and keyword duration model.

The secondary score is the log likelihood ratio between the probability the putative hit matches the true model and the false-alarm model.

[8] From 67.5% to 72.0% in this experiment. [11]

$$S_s = -\log\left[\frac{p(E|truth\ model)}{p(E|false\ model)}\right]$$

These probabilities are calculated using a dynamic programming approach to find the most probable path of the putative hit through the segments, taking the transition probabilities between segments, the likelihood of each segment and the duration model of the keyword into account. The primary and secondary scores are then range-normalised and added to produce a final combined score according to the formula:

$$S_c = \hat{S}_p + \hat{S}_s = \frac{S_p}{S_p^{90} - S_p^{10}} + \frac{S_s}{S_s^{90} - S_s^{10}} \quad where\ S^n \equiv\ nth\ percentile\ of\ S$$

This is used to re-order the set of putative hits and reduce the false-alarm rate of the word-spotter. A more sophisticated combination procedure could probably increase the performance of the word-spotter further. Note that the improvement in performance from using this secondary processor is highly dependent on the training data available. If no false alarms are generated for a given keyword from the training data, then no secondary model can be produced and the secondary processing will not help reject spurious false alarms for that keyword. For maximum benefit, therefore, a large amount of training data is required which includes many instances of the keyword(s), allowing the primary word-spotter to generate several true hits and false alarms.

3.4 Reducing Run-times Using Lattice-Methods

The keyword/filler model word-spotters discussed in the previous section perform well if the desired keywords are known in advance. However, specifying new keywords necessitates re-running the word-spotter and in some cases further training if no model for the new keyword already exists. [9] This can lead to slow performance. For word-spotting applications such as message retrieval from a large speech corpus, where many different keywords may be used to try to recover the required information, the flexibility in choice of keywords and the time taken to locate them is crucial.

James and Young [13] take a novel approach to this problem by pre-processing the speech to form a phone-lattice, which can then be searched at run-time to locate the probable occurrences of the keywords. Such a system requires an increased storage capacity to hold the lattice and uses more time in pre-processing, but once processed, the word-spotter has been shown to run at up to 360 times faster than real-time for one keyword. [13] This word-spotter also allows the unrestricted re-specification of keywords without necessitating further retraining.

[9] For example if using a whole-word based word-spotter such as a large vocabulary system where the new keyword is not included in the system vocabulary

The phone lattice is a connected loop-free directed graph and consists of nodes representing given points in time and edges representing the most probable phone hypotheses and their associated likelihood. The recognition network consists of all possible phones in parallel and the lattice is generated using a modified Viterbi speech recogniser based on the Token Passing Paradigm. The degree, N, of the lattice is the maximum number of edges that can begin at any node. Choosing the degree for the lattice is a trade-off between the increased possibility of missed hypotheses as the degree is reduced against the increased search time and storage requirement for larger values of N. An example of a phone-lattice of degree 2 is given in figure 10.

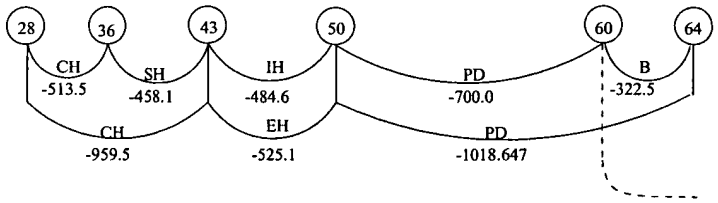


Figure 10: Example of a phone-lattice of degree 2 for the word `ship`

Recognition is then achieved by searching through the lattice to find the desired keyword phone-sequence. Phone insertion, deletion and substitutions can be allowed in the dynamic programming paths using empirically determined penalties for each action, but this increases the required computation time and the false alarm rate. Measures to limit this extra computation such as defining "strong" phones which must be matched exactly, or only allowing substitutions by similar types of phones further increase the amount of information storage and pre-processing necessary. James and Young [13] found only a 2% drop in FOM for triphone-based experiments when marking all phones as strong (i.e. allowing no substitutions, deletions or insertions) with a corresponding 50% increase in speed.

An alternative method for lattice building and searching which allows more flexible models of keywords has been proposed by Gelin and Wellekens [10]. The *a posteriori* probability of a phone occurring is calculated using the standard forward coefficients or a Multi Layer Perceptron. After smoothing by low-pass filtering, segments of the speech where this smoothed probability exceeds a certain threshold value are detected and denoted $X_t^s = [x_t, ..., x_s]$ as shown in figure 11.

Assuming the acoustic vectors are independent, from Bayes rule a duration-independent likelihood of the phone ψ given the segment is given by

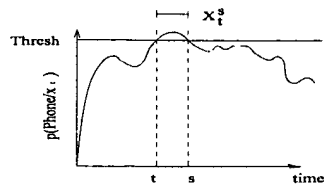


Figure 11: Generating Phone Hypothesis Using Thresholding

$$P(\psi|X_t^s) = \frac{\prod_{i=t}^{s} P(x_i|\psi) \quad P(\psi)}{\prod_{i=t}^{s} P(x_i)} = \frac{\prod_{i=t}^{s} P(\psi|x_i)}{P(\psi)^{s-t}}$$

For each segment a hypothesis consisting of the phone being considered, this associated probability and the start and end times of the segment is added to the lattice, L. To account for variability in pronunciation, each phone, ψ_n, in the lattice is allowed to be replaced by its q most confusable phones, ψ_n^i, (i=1 to q) generating a series of possible sequences, $\tilde{\phi}_g$. Each such sequence has an associated sequence confusion probability, $P(\tilde{\phi}_g)$, based on the confusion probabilities between phones, $P(\psi|\tilde{\psi}_g)$. The search stage then simply reduces to finding the maximum probability of the occurrence of each sequence, $\tilde{\phi}_g$, followed by finding the most likely occurrence of the keyword sequence, ϕ:

$$P(\phi|L) = \max_g [P(\tilde{\phi}_g|L)\ P(\tilde{\phi}_g)]$$

The use of confusion probabilities allows speaker-independence to be achieved across regional accents. For example, the acoustical dissimilarity of the Northern English /æ/ and the Southern English /a:/ for the letter *a*, will not degrade performance in a confusion-based system as much as in a purely acoustically based system.

4 Conclusions

Word-spotting has many applications ranging from telephone routing and message classification to new-word identification and speech indexing. This essay has discussed the fundamental principles behind word-spotting and described some techniques currently used to implement such a system.

The method of implementation depends on many factors including the necessary speed and accuracy of the word-spotter, the amount and type of training data available, the number of desired keywords, the required flexibility of the keyword vocabulary and the place of the word-spotter in an overall system. [10]The main word-spotting implementations are summarized in the following table.

[10]such as a message classifier

Property		Conditions for Most Appropriate Use
HMM keyword/ filler model	Whole-word keyword models	Small set of pre-defined keywords Many instances of keywords in training data
	Sub-word keyword models	Few instances of keywords in training data Possibility of changing keywords exists
	Large Vocab. system	Non-keyword vocabulary known Large but fixed keyword vocabulary
Lattice approaches		Fast implementation critical Keyword specification at run-time necessary Required storage and pre-processing not important
	Confusion-based	Variation across regional accents is known

A commonly used HMM-based system has been explained in detail and the effect of varying several key parameters has been investigated. A null-grammar was found to be the most appropriate language model for most word-spotting applications. Mel-frequency cepstral coefficients and their derivatives proved to be the most successful choice of feature vector. The system performance was shown to improve by increasing the number of syllables in keywords. The most appropriate choice of keyword and filler model implementation was shown to depend on the number and desired flexibility of keywords, the nature and knowledge of non-keyword speech and the training data available. Whole-word keyword models work well when many instances of the keywords occur in the training data and a small fixed keyword vocabulary is used. Sub-word units (of which the triphone proved to be the most successful) can be used to allow increased variability in choice of keywords and shared training of models from limited data, but suffer from permitting spurious sub-word substitutions, deletions and insertions.

Forward-backward and Viterbi scoring were discussed and shown to produce similar performance, although the forward-backward method offers slight computational advantages. Normalisation of the putative score using the background model score was incorporated to improve performance. Finally, the ability of secondary processing to increase performance by reducing the false alarm rate in the putative hits was demonstrated.

Some alternative lattice-based approaches were offered for applications where speed and flexibility of keyword choice is crucial and the ability to model regional accent variations was demonstrated. Other possible word-spotter implementations, such as using neural networks also exist, [1, 6, 9, 10] but have not been detailed in this essay.

Word-spotting covers a large range of applications and different approaches to the problem are appropriate for each set of circumstances. This essay has investigated the advantages and disadvantages of various implementations and suggested applications for which each might be suitable.

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